

REPORT
OF THE
MINISTER OF AGRICULTURE
FOR THE
DOMINION OF CANADA
FOR THE
YEAR ENDING MARCH 31, 1921

PRINTED BY ORDER OF PARLIAMENT



OTTAWA
THOMAS MULVEY
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1921

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REPORT

OF THE

MINISTER OF AGRICULTURE

1920-1921

*To His Excellency the Duke of Devonshire, K.G., P.C., G.C.M.G., G.C.V.O., etc.,
etc., Governor General and Commander in Chief of the Dominion of Canada.*

MAY IT PLEASE YOUR EXCELLENCY:

I have the honour to submit to Your Excellency a report of the Department of Agriculture for the fiscal year ended March 31, 1921.

The work of the department was carried out in a most efficient and satisfactory way and there will be found included herein a summary of the operations of the different branches of the department, all of which is laid before Your Excellency under their respective headings.

The legislation affecting the department during the period consisted of:—

Chapter 3, 10-11 George V., intituled “An Act to amend the Animal Contagious Diseases Act.” (Assented to 11th May, 1920.)

Chapter 30, 10-11 George V., intituled “An Act to amend the Oleomargarine Act, 1919.” (Assented to 16th June, 1920.)

Chapter 47, 10-11 George V., intituled “An Act to regulate the Sale and Inspection of Commercial Feeding Stuffs, Beans, Shorts, Middlings and Chop Feeds.” (Assented to 1st July, 1920.)

Chapter 53, 10-11 George V., intituled “An Act to amend the Inspection and Sale Act.” (Assented to 1st July, 1920.)

Section 6 of An Act to Amend the Criminal Code, chapter 43 of the Statutes of 1920, 10-11 George V, provides for the supervision of betting on race tracks in Canada. The administration of this section is placed under the control of the Department of Agriculture, but as the racing season was almost over when the Act in question was passed, no steps were taken this year to put the section into effect.

A Proclamation under date of the 27th November, 1920, declaring that chapter 47, 10-11 George V, intituled “An Act to regulate the Sale and Inspection of Commercial Feeding Stuffs, Bran, Shorts, Middlings and Chop Feeds,” shall come into force upon, from and after the 1st day of January, 1921. (*Vide Canada Gazette*, vol. LIV, p. 2168.)

By Order in Council approved under date the 14th April, 1920, the General Regulations under “The Destructive Insect and Pest Act,” approved under date the 17th July, 1917, and amendments thereto, were further amended. (*Vide Canada Gazette*, vol. LIII, p. 3625.)

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By Order in Council approved under date the 30th April, 1920, the Special Cattle Mange Order for the provinces of Alberta and Saskatchewan and the Regulations respecting Mange in Cattle in the provinces of Alberta and Saskatchewan established by Order in Council approved under date the 8th June, 1911, and amendments thereto were rescinded, and amended special Cattle Mange Order and Regulations were substituted therefor. (*Vide Canada Gazette*, vol. LIII, p. 3809.)

By Order in Council approved under date the 1st May, 1920, section 26 of the Regulations established by Order in Council approved under date the 29th April, 1919, in virtue of the provisions of chapter 32, 7-8 George V, intituled "The Live Stock and Live Stock Products Act," 1917, was rescinded, and the following regulation substituted therefor:—

"26. The proprietor shall not permit the disposition in the yard of deads, downers, cripples, immature calves or calves under three weeks of age except, under the authority of the minister or inspector."

By Order in Council approved under date the 15th May, 1920, the Regulations respecting the Inspection of Meat and Canned Goods, established by Order in Council under date the 1st August, 1910, and amendments thereto, were rescinded and amended Regulations were substituted therefor. (*Vide Canada Gazette*, vol. LIII, Supplement to May 29, 1920.)

By Order in Council approved under date the 24th May, 1920, the Regulations under "The Destructive Insect and Pest Act" approved under date the 17th July, 1917, and amendments thereto were further amended. (*Vide Canada Gazette*, vol. LIII, p. 4121.)

By Order in Council approved under date the 31st May, 1920, the Special Cattle Mange Order for the provinces of Alberta and Saskatchewan and the Regulations annexed thereto, approved under date the 30th April, 1920, as published in the *Canada Gazette* of 8th May, 1920, were amended. (*Vide Canada Gazette*, vol. LIII, p. 4337.)

By Order in Council approved under date the 9th August, 1920, regulations were established in virtue of the provisions of "The Animal Contagious Diseases Act," chapter 75, R.S.C., 1906, governing the importation of hides, skins, etc., with a view to the prevention of the introduction of diseases into Canada. (*Vide Canada Gazette*, vol. LIV, p. 953.)

By Order in Council approved under date the 12th August, 1920, a Ministerial Order establishing Regulations in virtue of the provisions of "The Animal Contagious Diseases Act," chapter 75, R.S.C., 1906, governing the importation of wool and hair with a view to the prevention of the introduction of disease into Canada, was authorized. (*Vide Canada Gazette*, vol. LIV, p. 956.)

By Order in Council approved under date the 12th August, 1920, the Regulations prescribed under section 9 of "The Live Stock and Live Stock Products Act," approved under date the 29th April, 1919, were amended.

By Order in Council approved under date the 12th August, 1920, in virtue of the provisions of "The Animal Contagious Diseases Act," chapter 75, R.S.C., 1896, the Order in Council of April 30, 1920, and amendments, in connection with mange, and all Regulations made thereunder, were rescinded. (*Vide Canada Gazette*, vol. LIV, p. 1854.)

By Order in Council approved under date the 21st August, 1920, the Regulations under "The Animal Contagious Diseases Act," approved under date the 30th November, 1909, and amendments thereto, were further amended by adding—

"Section 88½.—No person shall deface, cancel or take out, wholly or in part, any permanent mark which under direction of the Veterinary Director General has been applied to cattle reacting to the tuberculin test." (*Vide Canada Gazette*, vol. LIV, p. 1855.)

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By Order in Council approved under date the 21st August, 1920, the Order in Council approved under date the 28th November, 1919, amending certain Regulations under "The Destructive Insect and Pest Act," was rescinded and a Ministerial Order issued.

By Order in Council approved under date the 27th August, 1920, the Regulations governing the inspection of preserved fruits, vegetables and milk as approved under date the 15th June, 1918, were rescinded and new Regulations established in lieu thereof. (*Vide Canada Gazette*, vol. LIV, Supplement of September 4, 1920.)

By Order in Council approved under date the 30th August, 1920, the Regulations relative to the importation, manufacture and sale of oleomargarine in Canada, approved by Order in Council of the 5th February, 1920, were rescinded and new Regulations in lieu thereof established. (*Vide Canada Gazette*, vol. LIV, p. 952.)

By Order in Council approved under date the 6th October, 1920, the Order in Council approved under date the 26th May, 1920, permitting the importation of neat cattle from the United States of America into Canada free of duty by bona fide farmers and ranchers, was amended, to include sheep. (*Vide Canada Gazette*, vol. LIV, p. 1440.)

By Order in Council approved under date the 26th January, 1921, the Regulations under "The Animal Contagious Diseases Act," approved under date the 30th November, 1909, and amendments thereto, were further amended by revising section 39 thereof. (*Vide Canada Gazette*, vol. LIV, p. 3182.)

By Order in Council approved under date the 26th January, 1921, the Regulations under "The Animal Contagious Diseases Act," chapter 75, R.S.C., 1906, approved under date the 30th November, 1909, and amendments thereto, were further amended by adding:—

"Section 28 $\frac{3}{4}$.—The agent of any railway or common carrier receiving cattle or other live stock for shipment shall attach to the way-bill accompanying such shipment the district health certificate relating to such cattle or other live stock whenever the owner or shipper possessing such certificate requests him to do so." (*Vide Canada Gazette*, vol. LIV, p. 3192.)

By Order in Council approved under date the 25th February, 1921, section 3 of the General Regulations under "The Destructive Insect and Pest Act," established by Order in Council as of date the 17th July, 1917, was amended by rescinding that part of it which read as follows:—

"Truro, N.S., and Digby, N.S., for nursery stock, destined to points in the province of Nova Scotia only, from March 15 to May 15, and from October 7 to December 7." (*Vide Canada Gazette*, vol. LIV, p. 3746.)

By Order in Council approved under date the 21st February, 1921, the Regulations established by Order in Council approved under date the 19th August, 1911, and amendments thereto, of date the 4th December, 1913, regarding the movement of horses in the provinces of Alberta and Saskatchewan, in virtue of the provisions of "The Animal Contagious Diseases Act," chapter 75, R.S.C., 1906, were rescinded. (*Vide Canada Gazette*, vol. LIV, p. 3533.)

By Order in Council approved under date the 21st February, 1921, the forms approved by Order in Council of date the 12th August, 1920, in connection with Regulations established in virtue of the provisions of "The Animal Contagious Diseases Act," chapter 75, R.S.C., 1906, governing the importation of wool and hair into Canada, were rescinded and new forms established in lieu thereof. (*Vide Canada Gazette*, vol. LIV, p. 3536.)

By Order in Council approved under date the 24th March, 1921, Regulations were established in virtue of the provisions of chapter 53, 10-11 George V, intituled "An Act to amend the Inspection and Sale Act." (To come into force on the date of their publication in the *Canada Gazette*.)

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Prior to the opening of the meetings of the General Assembly of the International Institute of Agriculture held in Rome in the month of November, this year, an International Conference was held at the Palace of the International Institute of Agriculture for the Organization of the Control of Grasshoppers.

A summary of the proceedings of this conference will be found as an appendix hereto. (See appendix No. 1.)

DOMINION EXPERIMENTAL FARMS AND STATIONS

The experimental work of the Experimental Farms Branch during the fiscal year closing March 31, 1921, has made considerable strides towards approaching normal conditions. It has not been found possible to take up, as yet, a great many lines of new experimental work, owing to several unfavourable factors, such as lack of adequate staff, difficulty in obtaining the specially trained men required, lack of land at several of the Farms and Stations, limited appropriations and the great difficulty experienced in getting approved our plans for building operations. During the year, at the Central Farm the new dairy building completed and also the poultry administration building, both supplying very much needed room and facilities for carrying on wider experimental work. On the branch Farms and Stations the building work was of a minor nature.

During the year the following publications were sent to press and at the year's close a number of manuscripts have been sent in and will be available to the public early in the coming year:—

In the regular series of bulletins—

No. 95. French-Canadian Horse.

No. 96. Farm Business in Quebec.

No. 97. Wheat, Flour and Bread.

In the second series—

No. 43. Wintering Bees in Canada.

No. 44. Investigation of Potato Diseases.

No. 45. White Burley Tobacco in Canada.

In pamphlets—

No. 29. Grande Prairie Capabilities.

In exhibition circulars—

No. 99. Mushroom Culture.

No. 100. The All-year Hog Cabin.

No. 101. Potato Growing in the Maritime Provinces.

In circulars—

No. 18. Alfalfa Growing in the Vancouver Island Districts.

A fairly complete, though much condensed, account of the work of each division and each Branch Farm during the year will be found in the sections following.

NOTES ON THE SEASON

The winter of 1919-20 was especially severe but there was, after all, very little winter-killing of fall wheat or clover, due principally to the depth of snow and to the late opening of spring. The seeding season was very late, but favourable weather caused very rapid growth. Growing conditions in the east were favourable throughout the season but, in some districts in the west, dry weather lessened crop yields materially. The average yield of wheat per acre for all Canada was $14\frac{1}{2}$ bushels, as

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compared with 10 bushels in the previous year. At average prices, the value of all field crops in Canada was \$1,455,244,050, as compared with \$1,452,437,500 in 1919. This increase in value was due chiefly to better harvesting conditions as average prices were lower, excepting in the case of hay, clover and alfalfa, the prices for which were the highest on record.

The following table gives some data as to the yield and value of the principal field crops in 1920. In the second table the members of the various classes of live-stock in Canada during the period 1915-20 are given:—

AREAS AND ESTIMATES OF YIELD AND VALUE OF FIELD CROPS, 1920.

Crop.	Area.	Yield per acre.	Total Yield.	Weight per measured bushel.	Average price per bushel.	Total Value.
	Acres.	Bush.	Bush.	Lbs.	\$	\$
Fall wheat.....	814,133	24.00	19,469,200	60.14	1.88	36,550,500
Spring wheat.....	17,418,241	14.00	243,720,100	59.07	1.60	390,806,800
All wheat.....	18,232,374	14.50	263,189,300	59.35	1.62	427,357,300
Oats.....	15,849,928	33.50	530,709,700	35.62	0.53	280,115,400
Barley.....	2,551,919	24.75	63,310,550	47.62	0.83	52,821,400
Rye.....	649,654	17.50	11,306,400	55.44	1.33	15,085,650
Peas.....	186,348	19.00	3,528,100	60.44	2.42	8,534,300
Beans.....	72,163	17.50	1,265,300	59.73	3.88	4,918,100
Buckwheat.....	3078,476	23.75	8,994,700	47.95	1.28	11,512,500
Mixed grains.....	811,634	40.00	32,420,700	44.65	0.90	29,236,200
Flax.....	1,428,164	5.60	7,997,700	54.79	1.94	15,502,200
Corn for husking.....	291,650	49.25	14,334,800	56.45	1.16	16,593,400
Potatoes.....	784,544	170.50	133,831,400		0.97	129,803,300
Turnips, mangels, etc.....	290,286	401.00	116,390,900		0.41	48,212,700
		Tons	Tons		Per ton	
Hay and clover.....	10,379,292	1.30	13,338,700		26.10	348,166,200
Fodder corn.....	588,977	9.60	5,641,750		7.75	43,701,000
Sugar beets.....	36,288	11.37	412,400		12.80	5,278,700
Alfalfa.....	238,556	2.45	583,790		23.79	13,887,700

NUMBER OF FARM LIVE STOCK IN THE DOMINION, 1916-20.

Live Stock.	1916	1917	1918	1919	1920
Horses.....	3,258,342	3,412,749	3,609,257	3,667,369	3,400,352
Milch cows.....	2,833,433	3,202,283	3,538,600	3,548,437	3,530,238
Other cattle.....	3,760,718	4,718,657	6,507,267	6,536,574	5,947,142
Shieep.....	2,022,941	2,369,358	3,052,748	3,421,958	3,720,783
Swine.....	3,474,840	3,619,382	4,289,682	4,040,070	3,516,678

Experimental work, principally in the testing of varieties of cereals, forage plants, vegetables, and the hardier fruits, were carried on as usual at the Sub-stations at Swede Creek, near Dawson, Y.T., Salmon Arm, B.C., Fort Vermilion, Beaverlodge, Grouard, in Alberta, and at Forts Smith, Resolution, and Providence, in the North-west Territories.

The work at Fort Vermilion and Beaverlodge is quite extensive and some very valuable results are being obtained each year. A mass of data has been accumulated which will serve as an excellent guide, as to the possibilities of the districts served by these Sub-stations, to incoming settlers. At the other points mentioned above, the experimental work is much more limited in character. It is carried on under many special difficulties, such as poor transportation facilities, lack of adequate trained help, etc., etc., as well as the failures incident to severity of climate. However, gradually information is being collected as to the agricultural limitations of the districts in which these Sub-stations are located.

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THE ANIMAL HUSBANDRY DIVISION

Another successful year may be reported by the Animal Husbandry Division. While no distinctly new lines of work have been inaugurated, the year has been a busy one and although handicapped at present by lack of trained assistants, readjustments within the division have facilitated the handling of ever-increasing routine, correspondence, and work at Ottawa and in similar lines on Branch Farms.

HORSES

The excellence of the working force of horses has been well maintained and the increasing amount of horse labour handled economically and expeditiously.

The stock of registered Clydesdale mares now assumes fair proportions, there being six high-class aged females. Breeding operations were successful in 1920, and the prospects for several foals in 1921, by well-known sires, look better than ever before. Conditions for the winter care and management of in-foal mares have been improved and the mares are in ideal condition for foaling. During the year another good stallion was shipped to one of the Maritime Branch Farms.

In the show-ring, exhibits have been made at Ottawa, Toronto, Guelph, and Chicago, with highly encouraging results. While this feature of the work is possibly only of temporary or intermittent value, the results have been, nevertheless, far-reaching from the advertising standpoint.

One highly encouraging feature of the work with horses has been the clearly proven fact that, by correct methods of treatment, joint-ill, once the bug-bear of colt rearing on this Farm, has been overcome. In fact, at present, it would seem that only the services of a really high-class stallion are required to establish a stud of the quality that should represent the great Scottish breed on the Central Farm.

BEEF CATTLE

By the acquisition of grazing rights on the Connaught Rifle Ranges, it has been possible to start beef cattle feeding on range. During the early summer, three carloads of high-class steers were purchased. These made excellent gains during the summer and it was intended that they should be used in feeding tests during the winter. However, they were of necessity brought on accredited herd premises, and on the application of the test some twenty head reacted and had to be sacrificed in an unfinished state and on a glutted market. The balance of the steers were fed in open sheds and are now ready for sale. Unsettled conditions in the beef market and consequent low prices will preclude any chance of profit, a condition unfortunately affecting practically every feeder of beef cattle in Canada. The necessity of application of the tuberculin test to steers which cannot be bought subject to test makes this project a precarious and doubtful one on this Farm.

DAIRY CATTLE

Four dairy breeds are still maintained, Holsteins, Ayrshires, Jerseys, and French Canadians. Fairly heavy purchases have been made. In the early part of the year, an importation from Scotland of Ayrshires of exceptional quality was made on the purchase of one of the staff. These consisted of twelve cows and a bull. Further Ayrshire purchases of over a dozen head have been made in Ontario and Quebec. Some eighteen head of high-class Holsteins have been purchased in Ontario; an addition of seven females and a junior bull has been made to the Jersey herd; while in French Canadians an aged bull was purchased, he being bred and sold some years ago by this farm, and out of the champion cow of the breed.

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Unfortunately, during the year, further fairly heavy depletions were made by the tuberculin test as applied under the triple and combination methods. At present writing, however, it would appear from recent tests that the herd is nearer freedom from disease than has been the case during the past eight or ten years. Besides the regular herd, another, under the Bang System, is being operated, from which an excellent lot of calves have been taken.

Experimental feeding work has been considerably interfered with, as in the previous year, by reactions in the herd. Milking machine test work has been continued, two new machines having been added and changes made in others; tests of silages and rations are under way; several new feeds have been tested and numerous projects continued from the previous year.

Further study has been made of abortion, in the use of vaccines, treatment of infected cows, sterile cases, etc. It is gratifying to note that in this herd, once seriously infected with contagious abortion, the disease is apparently now in a controlled state. With two or three exceptions, the few abortions in the herd have been in cases left untreated, for experimental or check purposes.

Exceptional success has been met in the show-ring with cattle. Outstanding in the premiums won are those of grand champion Ayrshire at Toronto and Ottawa, and the winning of sweepstakes at the Ottawa winter fair dairy test with a Holstein cow. Exhibits were made at Toronto and the Ottawa fall and winter fairs.

Many well-bred bull calves, from tested dams and proven sires, and tuberculin tested, have been disposed of to farmers and breeding associations. Every female in the herd, eligible and of age, is entered in Canadian Record of Performance. Practically all will qualify and some excellent records have been made. A number of good record of merit tests were made under more or less commercial conditions—one of over thirty pounds butter in seven days and several close to that mark.

THE DAIRY

During the early part of the year an excellent dairy building was built and was ready for occupation in the fall. This building is modern, commodious, convenient and excellently equipped from the commercial farm and experimental standpoints. While the supply of milk has been too limited to prevent such experimental work other than that of a routine or test nature, arrangements are now complete for the manufacture of several new lines of soft cheese and for other lines of dairy work connected with the farmer's problem of marketing his milk. Research and experimental work is seriously handicapped due to present inability to carry on bacteriological study. Proper quarters for such work have been provided in the new building.

SHEEP

The range facilities already referred to have greatly bettered the conditions of the two flocks, Leicesters and Shropshires. The effect of practically unlimited range and good pasture has been particularly noticeable in the quality and size of the lambs in the fall. Close selection, coupled with better facilities, has resulted in two really high-class flocks at present. Purchases during the year consisted of several imported Leicester ewes which came from Scotland with the Ayrshire cattle. The demand for pure-bred males was not so keen as during former years.

SWINE

Following several years extra effort in swine production, it was considered advisable to reduce the herd of Yorkshires and Berkshires with the idea of strict adherence to quality and type. This has been done.

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Limited purchases were made, consisting of a boar of each breed and two Berkshire sows. Several Yorkshire sows were bred to an imported son of Lord Rosebery's famous boar, Jelliee, with resultant litters which have surpassed in quality those of the past several years.

Sales of pure-bred pigs have fallen off as compared with past years. Over four carloads of hogs have been marketed in Montreal and in the show-ring hogs from this farm have shown up well in strong competition at the Ottawa winter fair, notably winning sweepstakes in the dressed carcass competition.

Considerable experimental work has been carried on briefly as follows:—

1. *Experiments with Weaning Pigs.*

1. Basal Rations.
2. Basal rations plus animal and mineral supplements.
3. Home mixed versus commercial feeds.
4. Methods of weaning.

2. *Experiments with Growing and Fattening Hogs.*

1. Studies of feeds consumed per pound gain throughout the life of the market hog.
2. Indoor versus outdoor (dry-lot) summer feeding.
3. Mineral requirements of the indoor fed hog.
4. Green feed as a meal substitute where used as a soiling crop.
5. Commercial meals versus home-mixed.

Some excellent data have been collected—the testing of commercial meals, assuming considerable proportions and affording peculiarly timely information, which has already been disseminated through the press.

FEEDS

The feed market has been closely studied both with the idea of economical purchase and the opportunity of testing new feeds and by-products.

HEALTH OF STOCK

The following lines of work have received careful attention in so far as application and practical test are concerned:—

1. Contagious abortion. Tests of vaccines, treatment of infected and healthy cows, sterile cases and kindred ills.
2. The prevention and treatment of navel-ill in foals.
3. Studies of tuberculosis,—the various tests, the comparative results; the practical application of the Bang System; postmortem studies; building up a clean herd. Much of the foregoing study and observation has been made possible through the Health of Animals Branch.
4. Testing sheep dips, fly repellents, lice destroyers, etc., etc.
5. Treatment of parasitic infestation in swine and sheep.

EXTENSION WORK, CORRESPONDENCE, ETC.

Correspondence, necessitating reply of a detailed and specific nature, has been heavy. The call for information concerning buildings has increased and through the medium of a number of stock plans, much useful and specific information has been distributed.

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A survey commenced last year in the province of Quebec and the results of which are already published, has been continued in a more far-reaching way. The complete report of this later survey (Farm Business in Quebec) is now in the hands of the printers.

BRANCH FARMS

As usual, the work on the Branch Farms has been closely followed. Assistance has been given in the purchase of feeds and stock; outlining and suggesting experimental work; collection and co-ordination of records, results of experimental and test work, etc. Building work has been practically at a standstill.

GENERAL

While routine test and experimental work has of necessity claimed much of the time of the staff, opportunities have been taken to do considerable judging at fairs and exhibitions, attend demonstrations, farmers' meetings, lectures, conventions, live-stock sales and meetings in general in Eastern Canada. During the year the Dominion Animal Husbandman has visited all Farms and Stations in Canada where live stock work is carried on.

DIVISION OF FIELD HUSBANDRY

Heavy yields of farm crops were secured in 1920 at the Central Experimental Farm. Oats yielded 76 bushels per acre, hay 3.2 tons per acre, and ensilage corn 17 tons per acre on the main farm crop. The average yield per acre on this Farm for nine years in comparison with the average yield in the province of Ontario is given below:—

	Central Experimental Farm	Average of Province of Ontario
Oats	61 bushels	36.5 bushels
Hay	3.1 tons	1.5 tons
Corn	15.2 tons	9.5 tons

While undoubtedly the cost per acre of producing crops at the Central Experimental Farm was much higher than was the average throughout Ontario, nevertheless the profit per acre was also much higher. These yields demonstrate how suitable varieties of crops and proper tillage of the soil give good returns, especially when it is considered that the soil on this Farm was, when originally acquired, of a poor quality.

COST OF PRODUCING CROPS

Studies on the cost of producing crops are being carried on at the Central Experimental Farm and at all the Branch Experimental Farms. In view of the present marked decline in the price of farm commodities, while the cost of operations to the farmers have dropped only slightly, and, indeed, in some lines have increased, the usefulness of cost of production studies is very significant.

Tractors are used at sixteen Branch Experimental Farms and at the Central Experimental Farm to supplement the work horses in the general farm work. As accurate records are kept of the cost of operation, useful knowledge is gained regarding the utility of this power for farm work.

EXPERIMENTS WITH ROTATIONS, CULTURAL METHODS AND DRAINAGE

On the prairie Farms the comprehensive experiments on rotations and cultural methods which were commenced many years ago are now affording invaluable information on the control of soil drifting, which has, in recent years, and especially in 1920, become so menacing a problem to many farmers. These experiments have also given much information on rotations suitable for different types of farming and on cultural methods adapted to different districts and soils.

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Owing to the one-crop system of prairie farming, methods once widely used and very satisfactory have now become absolutely useless; these experiments have supplied knowledge which will enable farmers to change at once to a new system, without incurring financial loss.

On the eastern Farms, rotation experiments are being commenced. Drainage work has shown the cost of installing drains and the benefit derived. Experiments appear to indicate that tile in most soils may be laid somewhat shallower than three feet from the surface of the ground with better results than at three feet—the usual depth at which tile are laid.

A chief of the Division of Field Husbandry was appointed in August, 1920.

THE HORTICULTURAL DIVISION

Horticultural work is conducted on practically all the Experimental Farms and Stations, although on some more attention is paid to horticulture than on others, it being the aim to specialize in this work at a few places representing, to a great extent, large sections of Canada. In the Maritime Provinces the Experimental Station at Kentville, N.S., has large orchards and other horticultural plantations where many experiments of interest to the horticulturist are carried on. The Central Farm at Ottawa serves a large part of the province of Quebec and much of Ontario. At the Experimental Station, Morden, Man., a large area has been planted to fruit trees as it is hoped to make this Station the centre of horticultural work for the prairies. In British Columbia the Experimental Station at Summerland, in the Okanagan valley, is the one where the largest area is devoted to horticulture, but much attention is paid to it at the Station at Sidney, on Vancouver island, also, as the climate is so unlike that in the upper country.

At the Experimental Station at Kentville, N.S., one of the most interesting experiments in 1920 was that with English varieties of apples. There is a large collection of these there and many varieties fruited. Such a large proportion of the Nova Scotia crop goes overseas that it is important to grow varieties that suit the British consumer, and a few of the best apples grown in Nova Scotia are of British and European origin, such, for instance, as the Blenheim, Ribston, and Gravenstein, with which the British consumer is very familiar. Out of the large collection at Kentville it is hoped there will be found a few more which are well adapted to the Maritime Provinces. A collection of these sorts aroused much interest at a meeting of the American Pomological Society at Columbus, Ohio, where they were shown last autumn. The test with fertilizers for orchards at Kentville is of much interest to the fruit growers. One outstanding feature of the work in 1920 was that nitrate of soda should be used with care as there is danger of having trees grow too late, and be injured by winter in some seasons, as was the case last year in some experiments where nitrate of soda was used.

The orchards at all the Stations in the Maritime Provinces, and at Cap Rouge, Ste. Anne de la Pocatière, and Lennoxville, in Quebec, are now bearing fruit, and much valuable information was obtained in 1920 as to the merits of many new varieties that are being tested.

At Ottawa the breeding work received much attention in 1920, as it has in previous years. It is felt that making better varieties available to the fruit-grower will help him financially as there is room for great improvement in many sorts that are generally grown. As new varieties of merit originated at Ottawa had been thoroughly tested and found superior to others, it was decided this year to offer these for sale as rapidly as a stock could be worked up, as it is believed that in this way it will be possible to have them grown generally in a comparatively short time. When nurserymen have these special varieties in large enough numbers to supply the demand, the propagation of them for sale will be discontinued. Since this policy was announced there have been many applications for these new varieties.

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Some of those which are being propagated for sale are:—

Apples.—Melba, Joyce, Patricia, Lobo, and Pedro.

Plums.—Rideau, and Ottawa.

Grapes.—Craig.

Raspberries.—Brighton and Count.

Black Currants.—Kerry, Climax, Magnus, and Saunders.

Gooseberries.—Mabel and Charles.

Strawberries.—Portia, Hermia, Cassandra, and Mariana.

Many other new and promising sorts are under test, but, as the number of varieties offered for sale are already too numerous, it is not desired to introduce a variety unless it has distinct advantages for some part of Canada.

The native plum of Eastern Canada has many points of merit, being very hardy and productive, and bearing fruit having a thinner skin than most of the other wild plums. It ripens early, and where fruit-growers have put it under cultivation it has proved very profitable. There is great room for improvement in the fruit, however, as larger varieties are desired and with somewhat improved quality. The Rideau and Ottawa are two of these. Earliness, however, is a very desirable quality as these plums can be put on the market when there is little else in the plum line except those shipped from California. It is hoped to introduce shortly some improved types of this plum, and from the hybrids between this plum and the Japanese, which have been originated, other desirable sorts will come. There is such a very large area in Canada where the best plums cannot be grown that there is great room for hardier and better sorts. There was a good crop of plums in 1920.

The McIntosh apple is, perhaps, the most popular variety in Canada to-day, although the Northern Spy is a close rival. Special attention has been paid in the Horticultural Division to originating new sorts having the McIntosh characteristics yet being of a different season to McIntosh, and in the varieties being propagated for sale, which have been already mentioned, are some which will surely take a prominent place in Canadian horticulture in the future. Exhibits of fruit of these promising sorts were made in 1920 so that they could be seen by a large number of people.

Cultural experiments with vegetables and ornamental plants were continued in the Horticultural Division at Ottawa in 1920 as usual. The new varieties of vegetables originated there have given a good account of themselves with many experimenters. Further confirmation of the value of home grown seed of good strains of the standard varieties of vegetables was also obtained in 1920.

In the greenhouses, experiments were continued with the principal greenhouse crops such as tomatoes, cucumbers, melons, and lettuce, and valuable data obtained.

At the Experimental Station, Morden, Man., quite a number of the apple trees began to fruit in 1920. Southern Manitoba has proven much more favourable for the growing of this fruit than other parts of the prairies, and there is no good reason why large quantities should not be grown if the trees are protected from rabbits, which seem at present to be the greatest drawback to the successful cultivation of hardy apples there, as they did much damage during the winter of 1920-21.

Much attention was paid to the potato in 1920 as there is a great demand for good seed potatoes on and from the prairies, and varieties and methods of culture are being studied.

The Mennonites in Southern Manitoba have paid much attention to melon growing for many years, having succeeded in growing both watermelons and muskmelons of good quality near Morden, and the Experimental Station there is following this up by careful experimental work.

The Experimental Station at Summerland, B.C., has proved a very popular one among fruit growers, as it has given them an available bureau for reliable infor-

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mation. The experiments in different methods of irrigation, cultivation, and cover-cropping are beginning to give interesting results, which will be most valuable both to the experienced growers and to newcomers. Experiments with vegetables are conducted on a fairly extensive scale at this station as early vegetables have proved very profitable in this district, and it is desired to have reliable information for those who want it.

The climate of Vancouver Island is the mildest in Canada, and many economic plants may be cultivated there that cannot be grown successfully in the open in other parts of the Dominion, and, while the commercial planting of some of these would not be profitable, it is interesting that the plants thrive here, and shows the mildness of the climate. Among those which were growing at the Experimental Station, Sidney, in 1920, to which attention may be drawn, are the olive, almond, fig, persimmon, and tea plant. Here also the English filbert and English walnut succeed better than anywhere else in Canada so far as tests have been carried out. Experimenting with bulbs was continued successfully at the Sidney Station in 1920, the tulip, narcissus, and hyacinth multiplying well. Conditions are favourable for bulb growing owing to the long growing season which favours reproduction and the dry summers which make conditions good for curing the bulbs.

THE CEREAL DIVISION

THE SEASON

Cereal crops during the year 1920 were better than those reaped the previous year in a great many districts, but they fell far short of a maximum yield, except in certain highly favoured localities. The main difficulty was drought, though plant diseases and destructive insects were serious in some cases.

At Ottawa, conditions were fairly favourable and good crops were harvested in spite of the discouraging drought which occurred in the early part of the season. May was a very dry month, with scarcely any rain at all. The result was that the grain in some cases, not having been sown deep enough to come into contact with the soil moisture, lay imbedded in dry earth for weeks before sufficient rain fell to start germination. However, June proved to be a good month, favourable for cereals. July was exceptionally cool with an abundance of rain and some storms which caused part of the grain to lodge rather badly. Very hot weather occurred early in August which brought the crops on rapidly to maturity.

In the provinces lying east of Ontario, cereal crops were generally very good, while in the great central and western provinces drought, rust and insects caused damage. A larger crop than that of the previous year was obtained, but it was smaller than had been looked for.

TESTS OF VARIETIES

The total number of varieties under test at Ottawa is being steadily reduced because it was found impracticable to carry on such a large number of tests as was called for by the long list of sorts formerly under trial. About 700 varieties were tested last season. The number tried at the Branch Farms and Stations was considerably smaller than this.

NEW VARIETIES ORIGINATED AT OTTAWA

The new wheat, Ruby Ottawa 623, has attracted a good deal of attention and has received much favourable comment since the last report was issued. It is particularly adapted to the northern parts of the settled areas in all the provinces from Quebec to Alberta. This variety won some important prizes at the seed fairs—particularly at Saskatoon, Sask.—which naturally brought it into special prominence.

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The Liberty, Ottawa 480 oat—a variety which loses its hull in the threshing machine—is arousing much interest. Farmers are beginning to realize how valuable this oat will be in the raising of chickens and pigs. Last season we were obliged to refuse many requests for samples of this variety; but this season we had enough seed to supply all those who applied within the time-limits set (September 1 to February 1). About 2,500 samples have been sent out.

The new, very productive field pea, Mackay Ottawa 25, was distributed this year for the first time. Many new cross-bred varieties of cereals and peas are now nearing the end of their preliminary tests. It is expected that some of the most valuable of these will be named and introduced to the public very soon.

DISTRIBUTION OF GRAIN SAMPLES

The usual distribution of free samples of grain was carried on. The number of applications received was not quite so large as in some previous years, but, by the close of the season, which has now almost come, considerably more than 8,000 of these samples will have been sent out. The varieties chiefly in demand are Liberty (hulless) oats, Banner oats, Marquis wheat and Ruby wheat. There are always very many requests received for peas also. Arthur and the new sort, Mackay, are the two sorts distributed this year. There is also a good demand for samples of beans and flax, two sorts of crops of which the seed was distributed last season for the first time.

The reports which come in each year from the farmers to whom samples were sent, the previous winter, have steadily improved in quality during the past ten years. While doubtless some seed is wasted in a general distribution of this kind, many of the reports indicate the keen interest taken by the farmers in the excellent samples which they receive from Ottawa and show that they are able and willing to take proper care of them, and use them as a basis from which to obtain a new stock of improved seed for their farms.

MILLING AND BAKING TESTS

These tests were continued this season chiefly with a view to completing some studies on the effects of prolonged storage on flour and also in order to ascertain the baking qualities of a number of new, early-ripening, cross-bred wheats which are now on hand at Ottawa. The number of test loaves made in these experiments was 292, and the number of varieties studied was 86.

PUBLICATIONS

No new bulletin was issued in this division this year, but the manuscript was submitted and is now in the printer's hands for a rather large bulletin in which will be included the results of many investigations carried on in the Cereal Division during several years. This bulletin, which will be entitled "Wheat, Flour and Bread," will be of interest not only to scientific investigators, but also to farmers, millers, bakers, physicians and the public generally.

DIVISION OF FORAGE PLANTS

VARIETY TESTS

The usual variety tests with Indian corn and field roots were carried on at the Central Experimental Farm and on the branch Farms and Stations.

Concerning variety tests with field roots, a change in policy has been found advisable on account of the general falling-off in quality of root seed in general during the last few years. Instead of supplying the branch Farms and Stations

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with seed for variety tests from Ottawa, as has been the rule in the past, the superintendents have been requested to furnish the seed themselves, taking care that as many as possible of the varieties sold in the districts which the various Farms and Stations are serving are being secured. It is not the intention to publish the results of the tests with the names of the various seedsmen given. Any seed dealer, varieties from whom have been tested and who so desires will, however, be supplied with information appertaining to the results of the tests with his own varieties.

SUNFLOWERS

Owing to the deep interest recently taken in the growing of sunflowers for ensilage, quite extensive experiments were carried out, particularly in the western provinces. The results obtained so far are, however, somewhat conflicting and, on the whole, insufficient to allow safe conclusions to be drawn. More experiments are needed before anything definite can be said, either for or against introducing sunflowers as an ensilage crop.

ROOT SEED GROWING

During the last few years considerable information has been accumulated on root seed growing. Particular attention has been paid to questions relative to seed growing as a business undertaking and several experiments have been conducted with a view of ascertaining what principal factors are influencing the seed yields. Thus, early planting, comparatively close spacing of the seed-producing roots in the rows, and a high state of fertility of the soil have been found to be essential for large yields.

The importance of growing the seed on rich land was particularly well demonstrated this year. Half an acre planted to Yellow Intermediate mangel on very rich land gave 1,020 pounds of first-class marketable seed, i.e., over 2,000 pounds to the acre, and this in spite of the fact that a considerable quantity of seed was lost on account of shattering due to a hailstorm when the crop was in stocks. Half an acre of carrots planted alongside the mangels yielded 575 pounds of seed, or at a rate of 1,150 pounds per acre. The above yields are record yields for the Ottawa district.

BREEDING WORK

When the world war broke out, the Division of Forage Plants had a considerable amount of breeding work well under way, particularly with field roots, red clover, alfalfa, timothy, western rye grass and sundry other grasses. Owing, however, to the necessity of devoting much time and labour to the production of emergency seed crops of field roots, the division was forced to curtail the breeding work to a large extent. For the same reason it was found impossible to take up new lines of work.

Although, under the circumstances, comparatively small progress was made in so far as the actual development of new varieties of a superior type is concerned, yet considerable work was done preparatory to a resumption of breeding work on an extensive scale as soon as the abnormal conditions arising out of the war should begin to disappear. Thus, many observations on the relative merits of various breeding systems were made which have resulted in much improved practical methods, making it possible to proceed with breeding of grasses, alfalfa, and clovers at a higher rate of speed and at the same time with a greater assurance of reliability in the results aimed at than it was possible to achieve with the breeding methods formerly employed. Much material of the principal grasses and clovers suitable as foundation stock for the development of new varieties, was also collected during the war years and kept ready for use as soon as conditions would allow breeding work to be resumed.

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In the spring of 1920 the division was therefore ready to resume breeding with quite a number of forage plants, including timothy, meadow fescue, orchard grass, Kentucky blue grass, red top, Tall Oat grass, alfalfa, alsike clover, white sweet clover, in addition to breeding of field roots, red clover, and western rye grass, which latter crops were worked with during the war.

Not less than 140,000 individual plants were potted and transplanted in the field for breeding purposes during 1920.

SOME RESULTS OF BREEDING WORK

Field Roots.—Quite conspicuous results have been achieved, through breeding, with mangels and carrots. Of the former has been developed, from a very uneven and variable sample of commercial Yellow Intermediate, a uniform variety of high dry-matter content, and of the latter has been developed a uniform variety from Danish Champion, which in all respects is more satisfactory than the original type.

Red Clover.—As a result of breeding a red clover has been developed which, judging from experience so far, is not only hardier than ordinary red clover but also more durable because it contains an unusually high percentage of perennial types. A block of the new clover is now being propagated for comparative tests throughout the Dominion.

Western Rye Grass.—About one hundred and forty uniform and constant varieties are this year growing at the Central Experimental Farm. Of this number thirteen were sufficiently advanced to be tested for comparative hay and seed productiveness. Such a test has revealed that extraordinarily great differences exist in the yielding power of different varieties. Out of the thirteen varieties referred to one was found to yield nine times as much hay as the poorest one and three over seven times as much as the poorest one. The highest yielding variety produced over twice as much hay as the average of the remaining twelve.

As the ordinary western rye is a mixture of poor and good types, the isolation of the latter and their development into uniform varieties is evidently of great importance.

A number of the best varieties will be sent for comparative tests at the branch Farms and Stations throughout the West next year.

THE POULTRY DIVISION

The work of the Poultry Division for the past year has continued to develop fairly satisfactorily. A number of the plants at the seventeen branch Farms have been extended in order better to conduct investigations and to secure more experimental data.

The general lowering of feed prices has stimulated the poultry industry throughout the whole country. This stimulation has been helped by the fact that prices received for poultry products have not decreased in comparison with the feed, but as a rule, have held their own, practically throughout the entire year. The one exception has been the price received for eggs during the spring months, it having decreased earlier this year than usual, owing largely to the extremely mild winter throughout America.

The application for general information has kept up to normal, if not increased, and during the spring months the inquiries for information on incubation and brooding have been higher than usual. The demand for eggs and chicks also indicates an increased interest throughout Canada and it looks as though 1921 would be a fairly good year for production, the low prices for eggs will increase consumption and the favourable weather this spring will help in the rearing of the young stock.

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A very brief summary of the work of the year follows:—

BREEDING

The pedigree breeding work conducted at the Central Farm and at a number of the Branch Farms is producing results. Each year brings a larger number of high producers, which in turn are able to transmit their producing qualities to the offspring. More than ever, attention is drawn to the fact that high production can be secured in Canada, and a few instances of production on the Experimental Farms may be noted:—

The twelve breeding pens at the Experimental Station, Kentville, N.S., are full of birds that in their pullet year laid an average of 197 eggs. It was at this Station that one Barred Rock pullet laid 104 eggs in 104 days. The Experimental Farm at Indian Head, Sask., last year with 105 pullets gave an average of 183.7 eggs, the highest being a pullet with 292 eggs. This pullet is a daughter of Prairie Queen that last year gave 259 eggs. At Lethbridge, Alta., a selected pen of 55 pullets hatched in March and April gave an average of 203 eggs in one year from the time the first egg was received from the flock. The highest individual production was 265 eggs. The Brandon, Man., Farm had a Contest pen record last year of 2,041 eggs for 10 birds, an average of 204 eggs. On the Vancouver Island Station, Sidney, B.C., a White Wyandotte flock of 200 pullets gave an average of 195.97, 29 of which were above 175 eggs, 82 above 200, and there a production of 300 eggs a year has been reached. At this Station the standard has been raised so that now no bird is kept for breeding if she does not lay 200 eggs the first year and no cockerel retained if his mother laid less than 250 eggs in her pullet year. These records show the value of selection through pedigree breeding and they also show that all sections of Canada are suitable for egg production.

FEEDING

Experimental work on feeding has been conducted at both the Central Farm and a number of the Branch Farms, and though the experiments are by no means complete the chief lines of experiment being the use of different mashes for egg production, a comparison of semi-solid and fresh buttermilk as poultry feed, and the use of tankage versus beef scrap.

BEST AGE FOR PRODUCTION

Each year, the month the pullets are hatched on the Farm system is noted, and the yearly production computed. Each year indicates that April is the best month to hatch layers.

COST OF PRODUCTION

Figures on cost of production have been secured at several of the plants as well as at Ottawa and the contests form good media for obtaining cost figures and are included. It will be noted that the figures given below are for cost of feed only. No estimate is given for buildings, depreciation or labour. It might be of interest, however, to note that, for an average flock, one hour per day should be more than sufficient labour for 100 hens. This hour a day should cover all the general work in connection with the plant and the incubation and brooding as well. Where trap-nests are used and records kept, it costs about \$2 per hen per year more to attend to them. This cost of course, varies with the number of birds and the convenience, but it may be taken as a fair average.

Cost of Producing Eggs in the Canadian Contest Last Year

For the first 16 weeks, November 1 to February 22, the Barred Rocks laid an average of 25.8 eggs at a cost of feed of 97.8 cents, the Leghorns 21.4 eggs at a cost

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of feed of 80.4 cents. The cost per dozen for these months was Rocks 45.1 and Leghorns .45. For the whole period of 52 weeks, the Rocks averaged 147 eggs at a cost for feed of \$3.10, or cost per dozen of 25.3 cents. The Leghorns laid 154 eggs each and feed cost 2.63, each dozen costing in feed 20.4 cents.

Costs in all the Contests for Feed only for the Six Months November 1, 1920, to March 20, 1921, 20 weeks

Ontario	29	cents per dozen eggs.
Canadian	31	" "
Manitoba	31	" "
British Columbia	33	" "
Alberta	35	" "
New Brunswick	39	" "
Saskatchewan	41	" "
Cap Rouge	57	" "
Prince Edward Island	63	" "

INCUBATION

At the present time there is in operation on the Experimental Farms system a variety of incubators, including locally manufactured lamp and electric machines, lamp machines found on sale in the various provinces, and a considerable number of mammoth machines with capacity of from 1,200 to 2,400 eggs, and one large mammoth machine, 10,400 egg capacity, at Ottawa.

As a rule, where more than 100 chicks are to be hatched, an incubator is advisable. Where several hundred chicks are to be hatched a small type of mammoth machine cut down the cost of operation and gives space for custom hatching and the sale of day-old chicks.

The 10,400 egg machine which has been used at Ottawa for the past two years was not a decided success, but this spring, with the new incubator cellar, the manufacturing company installed a more up-to-date machine of the same type, and at the present time the results are quite satisfactory. Good, strong chicks and a fairly high hatch are being recorded.

BROODING

Practically all of the Farms on the system have adopted the colony stove system of brooding, a small coal-burning heater which will accommodate from 200 to 500 chicks. These brooders are placed in colony houses or other suitable shelters, and have proven quite satisfactory.

At Ottawa and several of the other Branch Farms where earlier hatching is desired, the pipe brooders have been installed and for hatching during the later winter and early spring, the pipe system is satisfactory, but for general brooding the colony stove is to be recommended.

Plans of brooder houses and brooder equipment may be had from the Poultry Division, Central Experimental Farm, Ottawa, Ont.

DISEASE WORK

Dr. Wickware has been in charge of poultry disease work throughout the year and has conducted some valuable investigations in roup, canker, chicken-pox, parasites, etc.

EXTENSION

Under this section come matters that do not primarily belong to investigational work, but are conducted in order to present results of investigations to the public and to gain from actual conditions information of considerable value to the division. These include exhibits, farm egg and poultry accounts, egg-laying contest, bulletins, etc.

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Exhibitions.—The demand for the very instructive exhibit which is sent out increases each year and to such an extent that the division is not able to comply with all requests. All these exhibits are conducted through the Extension and Publicity Division of the Experimental Farm.

Farm Egg and Poultry Accounts.—This is another phase of extension work which is proving very valuable, judging from the interest taken by the public and the mass of valuable data received by this Division.

Inspection.—The inspection carried on consists of supervision of the Egg-Laying Contests throughout Quebec and the Maritime Provinces.

Egg-Laying Contests.—On the 29th of October, 1920, the first series of egg-laying contests conducted by the Experimental Farms closed, and on November 1, 1920, the second series started. The interest evidenced by the number of entries and the demand for reports and information have grown considerably. At present there is a contest in each province and the Canadian contest at Ottawa. Applications are already coming in for next year's contest.

Bulletins.—Bulletins No. 87, No. 88 and No. 89 being exhausted, have been rewritten during the year, and also a number of the exhibition circulars. The correspondence, the demand for blue-prints, circulars, bulletins and other information have increased materially during the year as has also the number of visitors at the Central plant and the Branch Farm plants throughout the system. In fact the poultry plants have been one of the connecting links between the public and the Farm. Everybody is more or less interested in poultry and the good price received for the product has made people anxious to get the best returns possible.

DIVISION OF CHEMISTRY

The larger part of the work of this division falls into one or other of the following classes: investigation, chemical service, and control. The investigational or research work upon the solution of agricultural problems is of prime importance and naturally receives first attention, for such must be recognized as the special object and function of a scientific institution established to promote and aid the welfare and development of agriculture. It is generally admitted that no material progress can be made in the industry unless science shows the way and lays the foundation. Chemical service is that phase of the division's activities which puts the division in touch with the man on the land, rendering him direct assistance of an educational, advisory and analytical nature which will help him to obtain better and larger crop yields and to feed his stock more profitably. This work is carried on chiefly through correspondence, and by the examination of samples of an agricultural nature—soils, feeds, well waters, etc., sent in by farmers. This direct service to farmers has wonderfully increased of late years; it is more and more appreciated and used. We must believe that it is taking a valuable and important part in the general improvement of agriculture throughout the Dominion. This important phase of work now occupies a larger share of the time of the staff, but the results fully justify the expenditure; its influence is wide and must affect for good the agricultural practice of the country. The control work undertaken has been chiefly that required by the Health of Animals Branch, Meat and Canned Foods Division, comprising the examination of samples from the packing-houses and canneries of the Dominion and of those submitted in the administration of the Oleomargarine Act. The Chemical Division has also done a considerable amount of investigatory and analytical work for several branches of the Government service, e.g., Post Office Department, Department of the Interior, Department of Naval Service, etc., and the several commissions and boards in connection with the soldiers' re-establishments and settlements.

The register of the division shows that during the fiscal year ending March 31, 1921, the total number of samples received and reported on was 3,734. Of these,

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1,896 were of a purely agricultural nature and for the most part submitted by farmers, 1,065 were packing-house and cannery products analyzed for the Meat and Canned Foods Division, Health of Animals Branch, and 773 were of flour examined for the Wheat Export Company and the Canada Wheat Board.

A number of the more important investigations in course during the year may be cited as follows:—

The influence of seasonal and soil conditions on the composition of wheat.—This comprises the analysis of wheat grown on the several Farms and Stations of the system throughout the Dominion and the correlation of the analytical results with data from meteorological and field observations. The importance of such an inquiry to Canadian agriculture is obvious.

The composition and nutritive value of sunflower silage.—Since the sunflower crop promises to be a more or less satisfactory substitute for corn in districts in which the latter crop cannot, by reason of seasonal conditions, be grown profitably, the results of this work will be of considerable interest. The series analyzed contained samples of the silage from the larger number of the western Experimental Farms and Stations. It is evident that if the silage is to be palatable and nutritious the crop must be cut before there are any appreciable signs of ripening.

Sugar beets.—The investigation to ascertain the suitability of soil and climatic conditions in the several provinces to the growth of sugar beets for factory purposes has been continued. The work includes the analysis as to richness and purity of certain varieties of recognized merit, grown on the several Farms and Stations of the system. The data are of value in indicating districts in which the beet sugar industry, in so far as the quality of the beet is concerned, might be successfully prosecuted.

The Composition of farm roots.—A large number of varieties of mangels, turnips and carrots has been analyzed. The results show that very large differences in dry matter and sugar content may exist between varieties in the same class of root. It is evident therefrom that yield and keeping qualities are not the only factors to be considered when selecting the varieties to grow.

Commercial feeding stuffs and mill feeds.—A large number of these, collected throughout the Dominion has been analyzed. The series includes all the principal feeds on the market. The results furnish information of the most practical nature and will greatly assist the farmer and stock raiser in his choice of purchased concentrates.

Nitrogen compounds in rain and snow.—The work in connection with this determination has been continued. The data indicate that there is furnished from this source between 6 and 7 pounds of nitrogen, per acre, annually, in forms readily available in plant food.

Soils in southern Alberta.—Very considerable progress has been made in the reclassification of lands in irrigable areas in this province. The work involves the chemical and physical examination of typical soils, and the determination of "alkali" in suspected samples, allowing the final classification into irrigable and non-irrigable parcels. Soils from areas under consideration for reclamation by drainage in Alberta and Saskatchewan have also been examined and reported on as to suitability for cultivation. This work is undertaken at the instance of the Reclamation Service, Department of the Interior.

INVESTIGATIONAL WORK WITH FERTILIZERS

This work is being carried on at ten of the Farms and Stations of the system and has furnished data of considerable value and interest.

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In Experiment No. 4, which has completed its eighth year, at Kentville, N.S., the fertilizers (without barnyard manure) are applied twice in the three-year rotation. The results from the eight-year period show the most profitable mixture to have been one composed of 185 pounds nitrate of soda, 415 pounds of superphosphate and 185 pounds muriate of potash per acre. Next in order of profit was a mixture of 150 pounds nitrate of soda with 500 pounds of basic slag (without potash) which proved distinctly most effective on the grain and hay crops of the second and third years of the experiment.

In Experiment No. 5 (fertilizers with and without ground limestone) the potato crop of 1920, the seventh since the commencement of the experiment, showed decreased yields for the plots in the limed area—a result in striking contrast to those from former years. The explanation may be that the crop on the limed plots having matured earlier, derived less benefit from late rains which caused a resumption of growth on the unlimed plots.

Experiments to discover the influence of phosphoric acid in promoting the maturity of corn and cereals were commenced in 1919 and continued in 1920. In all eight tests were made—three with corn and five with wheat. In no single instance was there any noticeable difference in the degree of maturity between treated and untreated plots at harvest time, nor was any appreciable increase in yield recorded.

In Experiment E, concluded, at Agassiz, B.C., the most significant feature was the remarkable response to nitrate of soda by the grain crop of the second year. In the unfavourable season the average yield of oats from the plots (fertilized the previous year) was only 20.3 bushels, whereas with applications of from 133 to 266 pounds nitrate of soda per acre to the oats, the yields were from 45 to 73 bushels per acre.

WOOL EXAMINATION

Wool samples to the number of about 200, from the several provinces of the Dominion, have been examined and their loss on scouring determined. This work was undertaken for the Sheep and Goat Division, Live Stock Branch, the results to be used in the valuation and grading of native wools. This is the first work of the character undertaken in Canada.

The work for the Meat and Canned Food Division, Health of Animals Branch, has included the critical examination of 1,269 samples. These comprised lards, tallows, oils, preserved meats, sausages, mince meats, preservatives, denaturing oils, colourings and dyestuffs, pickling solutions, spices and condiments, evaporated apples, butters, oleomargarines, condensed and evaporated milks and other products of the packing houses, canneries, etc., under the supervision of the Government.

DIVISION OF BOTANY

PLANT PATHOLOGY

A systematic survey of the plant diseases prevalent in the Dominion during the past year did not reveal any unusual losses—such as occurred, for instance, during the grain rust epidemic in 1916. However, the general loss from all kinds of diseases is considerable each year, and the officers of the division find themselves fully occupied in investigatory and extension work.

It has been the policy of the division mainly to attend to the important problems—such as those of more or less national character. Thus the potato disease control aimed at by a system of seed inspection and certification becomes wider and wider in scope. The white pine blister rust work clears the situation year after year, and the grain rust investigations carried on in the west make satisfactory progress. Yet many phases of work await attention. It is hoped soon to commence systematic work in British Columbia on the problem of the control of fire blight, which has been doing considerable damage in the pear and apple orchards of that province.

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The experimental activity of the division extends throughout the Dominion, and during the year the results of some five years' work on certain constitutional diseases of the potato were carefully compiled and will appear in the shape of a special bulletin. Other experimental data are being published more fully in the report of the Experimental Farms. The routine work, including preparation and free distribution of nitro cultures, as well as advisory work in plant pathological matters, has been continued with very satisfactory results. The members of the staff have rendered most satisfactory services.

ECONOMIC AND SYSTEMATIC BOTANY

Many requests of the usual kind in reference to weeds, poisonous and medicinal plants, and other plants of economic importance were received. Altogether 550 specimens were received for identification.

The Annual Exchange List of Seeds, containing 511 species, was sent out to the leading botanical gardens in foreign countries. During the year 642 packets of seeds and two species of rooted plants were received from other countries, and 677 packets of seeds and ten species of rooted plants and cuttings were sent out.

Plots were again devoted to climatic tests on the culture of broom corn, sun-flower, soy bean, castor-oil plant, and hemp, with satisfactory results.

Experiments carried out on the eradication of various weeds by the use of "Atlas A" Weed Killer showed its value for this purpose.

A press article on "Oil-bearing Seeds" was published during the year.

THE TOBACCO DIVISION

The season of 1920 was not very favourable to tobacco growing, yet the 1920 harvest was the largest ever obtained in Canada. According to statistics gathered by this division, the production of tobacco in Ontario amounted to about twelve million pounds, and that of Quebec has been roughly estimated at from ten million to twelve million pounds.

In the tobacco-growing centres of northern Quebec the tobacco crop suffered considerably from seasonal conditions up to the beginning of August. From that date, however, the crop grew rapidly and although the tobacco leaf in general was shorter than usual, the harvest was an abundant one. In the Yamaska Valley district of southern Quebec the crop suffered less in the beginning of the season and gave a yield much better than the average, and also a greater proportion of leaves of sufficient length to be classed as cigar wrappers.

Prices, which had arisen considerably during 1918 and 1919, fell very low during the autumn of 1920. This brought on a serious crisis and the greater part of the tobacco crop was sold by the growers at less than cost price. The cause of this crisis was doubtless over-production in 1919 and 1920, coupled with decreased demand. It will be necessary to reduce considerably the area planted in tobacco in 1921 if still more serious loss is to be avoided.

The experimental work on the Harrow Tobacco Station was continued and, speaking generally, confirms the results obtained in previous years.

In Ontario the growing of tobacco continued to spread more and more towards the east along the north shore of lake Erie. A new area in the neighbourhood of Simcoe seems to have a real future before it in the growing of White Burley tobacco, and also of yellow, flue-cured tobacco of the Virginia type. In the county of Norfolk there are found wide areas of light land which would seem to be specially suited to the production of these yellow tobaccos. It is yet to be seen whether the season is long enough to permit of the maturing of such varieties in that district, but, although

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the season of 1920 was not very favourable, it was found possible to obtain in Norfolk some crops of yellow tobacco, comparable as to quality with those of the tobacco-growing districts of Essex and Kent, which seems to furnish very fair evidence that Norfolk is suitable for growing such tobaccos.

The crop obtained at Farnham was certainly the best ever produced on that Station.

The experiments with commercial fertilizers begun in 1919 were continued and, judging by the crops harvested, it may be said, in a general way, that by the use of such fertilizers it is possible to increase considerably the average yield of the district. Although from this experiment it has not yet been possible to deduce a formula for the most economical fertilizer, it has been shown that a more liberal and more judicious application of manure and fertilizer gives an improvement both in the quality and quantity of the crop. The cost of production of a pound of tobacco on the Farnham Station rose in 1920 to 15 cents. Possibly this figure may be considerably lowered where the grower is not obliged to hire all his labour, but it indicates the precarious nature of this industry which, while paying 15 cents per pound to produce its crop, could only get from 10 cents to 12 cents per pound for it.

The work in plant pathology carried on by the division was continued on the experimental area at Ottawa and on experimental plots established in Ontario in co-operation with a certain number of growers. The most noteworthy result achieved was the establishment of a variety of tobacco for snuff which proved resistant to the tobacco root rot (*Thielavia Basicola*). The same resistant quality appeared to be possessed by the selection of White Burley, series J.R.B. 16. In view of the great importance of the characters to be fixed, however, the selections made must be given a more thorough test before being guaranteed as immune to the tobacco root rot mentioned.

Among the hybrids studied at the Central Farm at Ottawa, two Maryland hybrids seem particularly interesting on account of their heavy yield. These tobaccos are a little too thin in leaf to be used in the same way as are the Burleys, but it is possible that the Canadian tobacco industry may find a means of using them. On the other hand, a cross of White Burley and Gold Leaf tried on the Harrow Station seemed of real promise on account of the form of its leaf of an excellent "broad leaf" type, and also on account of its very good yield.

At the opening of spring in 1921, the chief of the Tobacco Division was sent to England in order to form an opinion as to the future of Canadian tobaccos on the English market. At the time there was a real demand for cigar wrappers and binders as produced in Quebec, and it seemed that possibly an equally good market might be found for the yellow tobaccos of Ontario, but as was feared, the result of the enquiry was much less encouraging with regard to the latter, as there seemed to be no demand for the yellow tobaccos. In communicating this information to the tobacco growers interested, the Federal Department of Agriculture did everything it could to induce them to decrease the areas planted to White Burley in Canada, and thus avoid the over-production, which was foreseen early in the autumn of 1920.

DIVISION OF ECONOMIC FIBRE PRODUCTION

This brief report must be prefaced with the information that owing to an extremely destructive fire, which completely gutted the flax building late in the fall of 1920, a number of valuable—some, indeed, invaluable—records were lost. Had it not been for the fact that a great number of our records were duplicated, it would have been almost impossible to furnish reliable data of the operations for the past fiscal year. Fortunately, however, owing to the system of record keeping followed, much of the information was available, in a slightly different form, elsewhere.

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VARIETY TESTS

A very important branch of the division's work for the fiscal year under consideration has been a continuance of the 1919 variety tests.

Many additional experiments were also carried out, with a view to making thorough and exhaustive tests as to the suitability of different varieties of seed for fibre production in Canada. As before, experimental plots were one-tenth of an acre in extent, and the rate of seeding adopted, after mature consideration, was 84 pounds per acre. Six varieties of seed sown over eleven acres were tested at the Central Experimental Farm during the season.

The following table gives the average results:—

Scutching Tests.	Levonian Long Stem	Indian Head Long Stem	Japanese No. 1.	Japanese Siberian.	Irish Pure Line No. 5.	Commercial Imported Dutch.
Rate of seeding per acre...	84	84	84	84	84	84
Retted straw.....	2,500	2,682	2,366	2,501	2,842	2,720
Temperature of retting....	72° F	72° F.	72° F.	72° F.	72° F.	72° F.
Average yield of fibre.....	397	392	317	327	407	391
Average value per pound....	75	75	75	50	75	75

COMMERCIAL TESTS

A series of commercial experiments was carried on in various districts in the Dominion, the test plots utilized ranging in size from one-tenth to one-half of an acres, twenty-nine acres in all being seeded. (Ninety per cent of the crop was produced on the Experimental Farms System).

Below is a table showing the average yield per acre of scutched fibre grown on the Experimental Farms in the provinces of Prince Edward Island, Nova Scotia, New Brunswick, Quebec, Ontario and British Columbia:—

Variety of Seed.	Rate of Seeding.	Retted Straw.	Method of Scutching.	Yield of Scutched fibre per acre.	Grade.	Value per pound.
Imported English.....	84	2,780	Belgian	379	3	cts. 0.50
Long Stem.....	84	2,500	"	397	1	0.75
Indian Head Long Stem...	84	2,682	"	392	1	0.75
Japanese No. 1	84	2,366	"	317	1	0.75
Japanese Siberian.....	84	2,501	"	327	3	0.50
Irish Pure Line No. 5.....	84	2,842	"	407	1	0.75
Imported Dutch.....	84	2,720	"	391	1	0.75

The flax grown in each plot was separately valued, the above figures representing the average valuations.

BINDER TWINE EXPERIMENTS

In order to test the value of binder twine from the linseed flax straw grown in the Prairie Provinces especially numerous practical experiments were conducted with the twine manufactured at Kitchener, Ontario, in 1919. This twine was tested at fourteen Experimental Stations, and while the results were not very encouraging, they were at least definite. A number of the stations reported adversely on the quality, as compared with that of Manila or Sisal hemp binder twine so that it may be stated that until a more efficient method of manufacturing is evolved the value of flax fibre as a raw material for the manufacture of binder twine may be regarded as

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negligible. It should be mentioned however, that the inferiority of flax twine is *only* noticeable with regard to the binding of wheat. It has been found quite satisfactory for use in the garden, for tying tomatoes, beans, etc.; and it certainly makes an excellent sewing twine for bags. Several of the superintendents who tried this initial consignment of twine are anxious to make further tests at a later date.

RETTING OPERATIONS

A very large quantity of flax was retted in a commercial way in concrete tanks between April and October. It was found that a temperature of 72°F. to 80°F. gives the quickest results, and that it is also better for the fibre when the flax is retted in tanks. The percentage of No. 1 fibre from tank-retted flax is greater than that from dew retted.

FIBRE GRADING

The system of grading inaugurated in 1919 in several of the mills in southwestern Ontario has been continued during the past fiscal year by special grading experts who have been secured to conduct the work. Proper grading of the different qualities of fibre is of great importance, since it will enable distant purchasers to buy by number or sign, without the necessity of actually inspecting the fibre. The now existing grades, three in number, are as follows:—

Dew retted qualities:—

D.P.A.—Superior dew retted warp;

D.P.B.—Medium dew retted warp;

D.P.C.—Medium dew retted weft.

The grading has worked in a highly satisfactory manner, despite that the difficulty of introducing the system has been great, and the prejudice against it marked. One of the chief obstacles to a universal introduction of the system has been that many of the so-called scutchers were not, and are not, able to decide on the technically desirable qualities of flax. While many men have been educated out of this condition, it will certainly require two or three more seasons to school them in the making of consistent, uniform grades, having in mind strength, weight, colour, oiliness, fineness, length and cleanness.

MACHINERY

The important question of an efficient pulling machine has been still further investigated. A number of newly invented machines have been given a thorough test. The one that has stood triumphantly under all trials that have so far been made is the Vessot machine, which is now being manufactured commercially and used by at least ten flax growers. The one in use on the Central Experimental Farm has proved eminently satisfactory, and has developed no serious, or fundamental defects.

A de-seeding machine recently invented has also been subjected to thorough tests and has proved satisfactory. The same applies to a scutching machine recently imported by the department from Ireland, which was inspected, while it was working there, by the chief of the Economic Fibre Division on his last official visit.

FIBRE SEED

The department has continued its arrangements for the inspection and grading of fibre flax seed grown in the province of Ontario for export. Certificates were issued by the department for such seed as (1) shows a germination of at least 90 per cent before shipment; (2) is well cleaned, and does not contain more than one noxious weed seed per ounce; and (3) is packed in sacks securely sewn and sealed, and containing a net weight of 169 pounds of seed. The department also requires that

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an affidavit of pedigree shall be produced showing that the seed is of a true fibre variety. Each of the sacks containing seed conforming to the prescribed conditions is branded in red letters, showing that it has been inspected, and it also bears the certificate number, or stock number, of the department. It is not obligatory on Canadian exporters to have their seed inspected, but it is a pleasure to report that all the Canadian seed shipped to Ireland this year *was* so inspected. The fact that a bag is branded and sealed, as above indicated, thus displaying evidence that the seed has been examined and passed by the department, should be a valuable safeguard to Irish buyers both as regards the quality and weight of the seed.

STATISTICS

The area of flax in Canada in 1920 was almost double the acreage of 1919. The crops in 1920 were harvested under dry weather conditions, and it is reported that the yield and general quality of the seed are superior to last year's, the seed being larger and plumper in the pickle. Preliminary germination tests made by the department gave good results, and several representative bulk samples taken from shipments which have been forwarded to Ireland, and which were tested by the Irish department, showed rates of germination varying from 92 per cent to 97 per cent.

THE BEE DIVISION

The work of the Bee Division has continued to expand. Apiaries have been maintained on seventeen of the Experimental Farms. Bee breeding experiments have been continued and a number of Italian queens and drones of non-swarmling parentage have been successfully mated under isolated conditions at Duck island, in the eastern part of lake Ontario.

Experiments at Ottawa in the control of swarming were continued. Easy methods of discovering colonies that are preparing to swarm and treating them effectively were investigated. The conditions for bee-keeping in the north were further studied at Kapuskasing and investigations into the value of bees in pollinating apple bloom at Kentville were continued. The collection of information about Canadian honey-producing plants was continued.

Bulletin No. 43, Second Series, "Wintering Bees in Canada," by F. W. L. Sladen, was published during the year.

DIVISION OF ILLUSTRATION STATIONS

ALBERTA AND SASKATCHEWAN

In 1920 sixteen Illustration Stations were operated in Alberta and fifteen in Saskatchewan. The rotations were continued as in the previous year; cultural methods however were outlined with a view to overcome the menace of soil drift which, over portions of these provinces, has become a serious problem.

Weather conditions in the south and south-east of Alberta, and in the central and southern part of Saskatchewan were again dry with damaging winds and high temperature. The yield of grain in each province was nevertheless considerably higher than in the season of 1919. Sales for seed purpose from the Station Farms have been made of potatoes, wheat, oats, western rye grass, and alfalfa seed. This means a spreading of forage crops and a raised standard of the quality of grain produced in the Station districts.

Rain gauges were supplied to twenty-one Stations, that accurate records may be made of the amount of precipitation received, moisture being a deciding factor of crop growth in these areas.

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Field meetings were held at certain Stations in Alberta and Saskatchewan, and much interest was taken, by the farmers of the district, in the work being carried on.

QUEBEC

In 1920 twenty-two Illustration Stations were in operation during the year. Twelve locations for new Stations were selected, work to commence in 1921.

Marked progress was made in the districts where illustration work was carried on, and a beneficial interest was sustained by the operator and neighbours, throughout the summer and winter. By a little assistance and some suggestions the scope of the work in the province has widened on the individual stations and adjoining farms.

Rotation of crops, cultural methods, gardening, poultry and general conditions in all lines show improvements.

Field meetings were held while crops were growing, and during the winter months, meetings were held at twelve points at which addresses were given by representatives of the division. The interest and attendance at these gatherings were considerably above what had been anticipated.

NOVA SCOTIA AND NEW BRUNSWICK

Eleven Stations were established and operated in the Maritime Provinces in 1920. During the season, ten more locations were selected for the work to start in 1921.

The first year's work consisted of preparation of the regular rotations. In this preparatory work, the value of thoroughness in cultural operations, and the advantage of liberal seeding to secure best results in the growing of clover and timothy were clearly demonstrated.

Fifteen public meetings were held during the winter months. The supervisor for the province assisted in short courses at Truro and Moncton. From the interest taken in the work much improvement is expected.

THE DIVISION OF EXTENSION AND PUBLICITY

The object of the Division of Extension and Publicity during the year under review, has been to interest and familiarize the people of Canada with the Dominion Experimental Farms and through a campaign of publicity to make generally known the work being done, experimental and otherwise, by the Central Experimental Farm and the Branch Farms and Stations.

This publicity has taken the form of (a) the display of exhibits at Canadian exhibitions and fairs; (b) the distribution of large quantities of literature through all parts of Canada; (c) the preparation of circulars for distribution at exhibitions and fairs, and for general distribution; (d) the editing of articles for the press on all subjects in connection with agriculture; (e) the addition of a large number of names to the mailing list for agricultural publications.

EXHIBITS

The exhibits sent out to the various exhibitions and fairs were practical and educative. The lessons they endeavoured to express were common sense, economy, progress, and they were arranged to appeal to those interested in any and all phases of agriculture. That these exhibits were successful was proved by the great interest taken by visitors and by the numerous questions asked the officers in charge of them. By this means the officers were able to furnish a great deal of valuable information on the results of experimental work carried on by the Experimental Farms.

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By increasing the number of fairs and exhibitions visited and also the number of exhibits, it is believed that thousands, particularly among the agricultural classes, have been brought into touch with the work of the Experimental Farms, who could have been reached in no other way. Eleven complete exhibits were prepared and forwarded from the Central Experimental Farm this year. Three were sent to branch farms and seven were displayed at thirty-six different winter, summer and fall exhibitions and fairs in Ontario.

General Exhibits, Ontario.—Four exhibits of a general nature representing the work of the various divisions of the Experimental Farms, were prepared at Ottawa and displayed at many important fall exhibitions and fairs in Ontario, including London, Kingston, Picton, Cornwall, Collingwood, Stratford, Galt and Renfrew, besides many other smaller country fairs. A general exhibit was also sent to Kapuskasing, this being the first time the station there had received one.

Special Exhibits, Ontario.—A combined seed, tobacco and poultry exhibit was shown at Chatham Corn Show, in January, 1921.

A flax exhibit, showing the processes in the manufacture of linen from flax straw and containing many samples of flax products and by-products was shown at a number of fairs in the sections of Ontario where the production of flax is or could be made a paying crop.

A circuit of Ontario winter poultry shows was arranged and a display containing instructive poultry transparencies and legends, poultry feeds and models of poultry houses and poultry house fittings, was exhibited at a number of these shows.

The Experimental Farm exhibit at the Central Canada Exhibition, at Ottawa, although of a very general nature, is also a very special display. The whole exhibit covered a space of sixty feet by eighty feet and, although it contained twelve separate and distinct displays, the general scheme of arrangement was so designed that the exhibit was attractive, uniform and compact. A definite amount of space was allotted to the officers of each of the twelve divisions, and they provided instructive material to illustrate their work and to draw questions from the many visitors.

Special, Prairie Provinces.—A large exhibit was sent to the five large exhibitions in the Prairie Provinces, viz., Calgary, Edmonton, Saskatoon, Brandon, and Regina. The main structure of this display prepared at Ottawa, was supplemented by material from the Branch Farms and Stations nearest the centres where the exhibitions were held.

Exhibits at Branch Farms.—In addition to the exhibits sent out from the Central Experimental Farm, all the Branch Farms had exhibits of their own and the superintendents made the necessary arrangements with the local fairs in their territory as to the erection of displays. At the larger exhibitions the exhibits from the Branch Farms and Stations are frequently enlarged and improved by the addition of material from Ottawa.

Exhibits, General.—Small general exhibits were sent to Indian Head, Saskatchewan, and Cap Rouge, Quebec. A poultry exhibit was sent to Amherst winter fair and the same exhibit was also shown at Sherbrooke and Quebec city.

GENERAL DISTRIBUTION OF LITERATURE

A number of exhibition circulars have been revised during the last year, and where necessary have had information added to them. Thousands of these circulars have been distributed at exhibitions and fairs in all parts of Canada. These circulars are also sent out in large numbers from the Division of Extension and Publicity and are very much in demand.

MAILING LIST

Many applications have been received during the year for literature to be sent regularly on specified subjects, but the booklet that appears to have the largest demand is "Seasonable Hints."

EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.

THE SEASON

The weather in 1920 was unusually severe, setting in early and continuing with steady cold weather until the latter part of March. Crops germinated quickly in the spring of 1920 and made extraordinary growth for a time, but the exceptionally hot weather during the first two weeks of autumn caused cereals to ripen very rapidly with a resulting tendency to yield grain light in weight per measured bushel. The autumn continued fine well into the month of November, giving ample opportunity to complete field work.

BUILDINGS

In addition to repairs and improvements, a new wagon shed was constructed and five additional contest houses for the laying contest work.

The underdrainage systems have worked satisfactorily and good crops were harvested on what was previously waste land.

HORSES

The horses at the Station comprised three pure-bred Clydesdale mares, one gelding, one two-year-old filly and one grade mare, as well as one express horse and one driving mare. These horses remained in good health and condition throughout the year.

DAIRY CATTLE

There were six purebred Ayrshire cows in the dairy herd during the year. They are all in excellent condition and at the provincial exhibition a number of prizes were won.

An experiment in feeding steers was carried on during the winter, from which were obtained some valuable experimental data, although high prices of feeds prevented a profit being made. At the fat stock show at Charlottetown three of these steers won first for pen, and first, third and fourth as individuals. Experimental work with swine was conducted during the year.

The poultry plant was enlarged to give greater accommodation and a large number of entries for the egg-laying contest were received. This contest closed at the end of October and the 1920-21 contest is now under way. Twenty-five pens of ten birds each are entered therein.

The field crops on the rotations gave the following average yields per acre:—

Crop	Area Acres	Average Bush.	Yield Lbs.
Wheat	6.57	26	52
Oats, Banner	11.00	58	
Barley, Charlottetown, No. 80	5.	41	20
Potatoes	3.57	209	58
Turnips .. .. .	.4	443	45
Mangels	1.	534	5
		Tons	Lbs.
Clover hay	6.47	2	609
Timothy hay	2.77	2	1618
Alfalfa	1.5		1966

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Much valuable data were obtained from the 309 cultural plots on which experimental work was carried on. Variety testing was conducted with cereals, Indian corn, field roots, clover and alfalfa, and in horticulture with tree and bush fruits, vegetables, and ornamentals.

A number of farmers' and breeders' associations held picnics at the Farm during the year. The superintendent conducted the course in field husbandry at the Agricultural Short Course held at the Technical and Agricultural School, and gave a series of lectures at the Home Economics Short Course, besides giving addresses at a number of Farmers' and Dairymen's Association meetings.

Exhibits were prepared and shown at several points in the province and a number of entries of Clydesdale horses and Ayrshire cattle and fat steers were made.

EXPERIMENTAL STATION, KENTVILLE, N.S.

The spring of 1920 was dry and seeding operations continued without interruption until completed. The very dry May hindered grass development, but this was partially regained by favourable weather in June with seasonable showers, and the hay crop was fair. There were no late spring frosts and the temperature during the summer was slightly above normal resulting in a fine corn crop. The season on the whole favoured the apple, and an average yield of fruit, good in quality, and reasonably free from scab was secured. There were no unusual weather disturbances during the season and the fall was ideal for gathering all crops. The weather throughout the season was such that more work was possible with less extra labour than for many years. The first fall frosts, two degrees in each case, were on October 16 and 21. Early ploughing was difficult because of the ground being too dry, but rains and an open November made it possible to plough almost to the first of December. The winter has been mild with little snow. The total precipitation for the year April 1, 1920, to April 1, 1921, has been 34.74 inches.

Seventeen acres of upland hay yielded at the rate of 2.2 tons per acre, eight acres of dyked marsh averaged 2.57 tons and eleven acres, not so well drained, 1.85 tons per acre. The oat crop was good. The yield from thirty-one acres at this Station averaged 56 bushels. The wheat averaged 21 bushels and barley 29 bushels per acre. The corn averaged 14 tons per acre and was well matured for silage. An area in sunflowers yielded 16 tons per acre. The mangel crop averaged 874 bushels. Because of May being so dry there were places where the seed did not start resulting in an uneven stand. The turnip crop was poor, largely because of the club-root disease.

The Shorthorn herd of 52 head is made up of 18 cows, 3 two-year-old heifers, 13 yearling heifers, 14 heifer calves and one herd bull. Eight bulls were sold for service during the year and six females were sent to the Experimental Farm, Nappan, for breeding purposes. Hedgyn Susan produced 10,864 pounds of milk in 384 days, and an average of 28.29 pounds per day. Hillview Victoria gave 6,188 pounds of milk in 322 days, an average of 19.21 pounds per day; Meadow Flower 24th, 6,623 pounds in 328 days, an average of 20.19 pounds per day; Kentville Jessamine, 6,008 pounds in 320 days, an average of 18.75 pounds a day.

Twenty head of steers were bought in the fall and fed during the winter. Because of a falling market there was no spread between cost and selling price, so that at finish they did not bring sufficient to pay for all the feed consumed. The weight at start was 18,497 pounds, the weight after 140 days' feeding was 23,474 pounds, a gain of 248.5 pounds per steer.

Yorkshire swine are kept and consist of one sow three years old and two young sows and a boar. Two breeding sows were sold during the year and ten registered young pigs.

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The poultry consisting of Barred Plymouth Rocks and White Wyandottes have made good records and breeding pens have been established with hens of the following average production in their pullet year: Pens 1 to 4, White Wyandottes, with 4, 5, 7 and 7 birds respectively, averaging 254, 209, 187 and 161 eggs each. Pens 5 to 12, Barred Plymouth Rocks, with 4, 6, 7, 8, 5, 6, 5 and 6 birds respectively, averaging 252, 222½, 200, 174, 239, 267½, 192 and 170 eggs each.

The thirty-six colonies of bees wintered in 1919-20 were in good condition in the spring except four colonies which were weak. The number of colonies was increased to fifty-six in 1920. The season was not a good one for honey, 1,168 pounds having been secured, an average of 36.5 pounds per colony spring count.

Tests were continued with different mixtures of commercial fertilizers on orchard and field crops. Agricultural grasses and forage crops and clovers including alfalfa and sweet clover are under test.

The yield of fruit on the 65 acres of young orchard at this Station was light. The crop was of good quality. The varieties of English apples under test fruited exceptionally well, but few of them gave promise of being of great commercial value.

A new horse barn, a poultry breeding house and four brooder houses were constructed during the year.

EXPERIMENTAL FARM, NAPPAN, N.S.

The winter of 1919-20 was very cold. There were over thirty-one days of zero weather recorded. The thaws were light. April was a normal spring month. May and June were fine and warm but lacked precipitation for good germination. Good growing weather prevailed through July, August and September. Rainfall was recorded on eleven days in August and thirteen in September, this wet period caused much damage to the early cut grain, particularly the wheat, which sprouted in stook. Good harvest weather prevailed through October and the first half of November. After the 13th of November heavy frosts were recorded and snow fell on the 23rd, this remained until the end of the month. The autumn ploughing period was short, consequently, not more than two-thirds of the average amount of ploughing was accomplished.

Taken throughout, the season was a very favourable one.

The following acreage was under cultivation at the Farm last season; seventy-four acres of grain, six acres of oats, peas and vetches, one-half acre of sunflowers, six acres of ensilage corn, ten acres of roots, two acres of vegetables, five and three-quarter acres of potatoes, eighty-two acres of upland hay, ninety acres of marsh hay, four and one-half acres of grain and clover plots, one-half acre of turnip seed, two acres of small fruits, one acre of stecklings and twenty-five acres of orchard.

The average yield per acre of farm crops was as follows: wheat, 24 bushels, 45 pounds; oats, 44 bushels 25 pounds; mixed grain, 20 bushels; barley, 20 bushels 42 pounds; corn, 15 tons, 1,615 pounds; oats, peas and vetches, 4 tons 1,707 pounds; turnips, 729 bushels 21 pounds; upland hay, 1 ton 949 pounds; twenty-six acres of upland hay averaged 2 tons 923 pounds; marsh hay, 1 ton 267 pounds.

The ground limestone sown four years ago continues to show beneficial effects in the clover crop. This test goes to prove that much of the eastern soil could easily be made more productive by the application of two tons of ground limestone to the acre.

The past season was an average one when considered from the horticulturists' point of view. Apples were a light crop, but of good quality. Dry weather effected the yield of the strawberry crop, the average yield for all varieties being 4,195.2 pounds per acre. Bush fruits were a medium crop, but of good quality. The average yield for the different varieties was: black currants, 5,907.5 pounds per acre; red currants, 7,624.3 pounds per acre; white currants, 7,966.6 pounds per acre.

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Cultural tests were made with different varieties of garden vegetables and good results were obtained.

Potatoes were a good crop, the average yield for field lots was 219 bushels of marketable potatoes. One of the plot varieties yielded an average per acre of 735 bushels.

The work in poultry was most satisfactory during the past season. The egg-laying contest had twenty pens entered. Out of the 200 birds entered, 52 qualified for Record of Performance. The total number of eggs laid was 24,226 or 121.13 per bird, at a cost per dozen of 35½ cents. The plant stock did much better, the average per bird for Barred Rock pullets was 131.40 eggs, at a cost of 30 cents per dozen. The average for Leghorn pullets was 122.3 eggs, at a cost per dozen of 31 cents.

The livestock work was expanded at this farm. A herd of Guernseys was established, consisting of eight mature cows and three young females and one male. The cows entered in Record of Performance have made good records. Kings Blanche of Hillside gave 12,238 pounds of milk, testing an average of 6.5 per cent; Princess Daisy of Hillside's record was 8,025.9 pounds of milk, testing 6 per cent; Princess Dairymaid 2nd, 7,569.6 pounds of milk, testing 6.2 per cent; Cabbage Rose of Hillside, 7,337.0 pounds of milk, testing 5.7 per cent.

A herd of beef type Shorthorns was also established at this Farm, consisting of seven mature cows, three young females and one male.

The "Grading-up experiment" was continued and satisfactory results obtained.

Twenty-six steers (beef) were fattened during the winter months.

Two herds of swine are kept at this Farm, namely, Yorkshires and Berkshires, and two flocks of sheep, pure-bred Shropshires and a grade Shropshire flock and good progress is being made along all lines.

The necessary repairs to all Farm buildings were carried out in addition to moving and remodelling the old creamery into an implement shed and storage cellar, and remodelling and adding to the farm-house on the new Clinton Roach property recently purchased by the department. This house is being used as a boarding house.

Five new colony houses, 10 by 12 feet, were built. Some 3,600 feet of new wire fence and 700 feet of new pole fence was erected during the season. All roads on the Farm were repaired during the year and some work put on the public highway adjacent to the Farm.

Agricultural meetings and exhibitions were attended by the superintendent and assistant to the superintendent and many excursions visited the Farm during the year.

EXPERIMENTAL STATION, FREDERICTON, N.B.

The winter of 1919-20 was unusually cold and stormy followed by a bright, cool, dry spring with much winter-killing of fall grains and clovers. Seeding began on the 7th of May and was completed earlier than usual. The summer was dry and cool until some heat in August, followed by a deluge in early September, seriously damaging a large proportion of the grain crop and encouraging the occurrence and spread of late blight and rot in potatoes. Crop yields generally were below the average. Pastures kept up well and with an abundance of silage, carried over, maintained a good milk flow. One Shorthorn cow made a record of 14,682 pounds milk and 677 pounds of butter in 395 days, while three cows of this breed averaged over 12,000 pounds of milk in the season. All classes of live stock did well. An Ayrshire in the two-year-old class made a Record of Performance record of 13,280 pounds of milk and 621 pounds of fat. Provision was made for a New Brunswick egg-laying contest; ten two-pen houses were built which were not sufficient to accommodate

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all applicants. From the opening of the contest on November 1 till March 31, the Fredericton pens stood third in the Dominion in number of eggs laid per bird. An implement shed and feed storage building was erected over a cellar previously constructed and some additional land brought under cultivation.

EXPERIMENTAL STATION, STE. ANNE DE LA POCATIÈRE, QUE.

The winter of 1919-20 was the most severe for many years. There was a fair amount of snowfall at the beginning of the winter, but soon after rains and a few days of high temperature melted most of it so that the land was left exposed to severe cold, causing the frost to penetrate very deeply. Late in the winter snowfall was abundant. The first seeding was done in 1920 about the 9th of May, where the land had been drained, but not until the 15th on undrained land. Rainy weather during this period delayed seeding operations. Drought followed, lasting until July 10, there being less than two inches of rainfall during that period. This reduced both the yields and quality of cereals, but the cultivated crops did not suffer so much owing to frequent cultivations conserving the moisture. Fruit crops were fairly good as a whole. Apples, plums and cherries gave a good crop. Small fruits also did well. The weather of 1920-21 has been very mild with good snowfalls, which has prevented winter-killing and kept the frosts from penetrating deeply.

During the summer there were 23 horses kept at the station, nine of these being grades. In the fall four of the more aged of these, unsuited for breeding work, were sold. The remainder have been kept over winter and include 14 very valuable registered Percherons, made up of a three-year-old stallion, eight mares, a two and a half year old filly and four spring colts. Breeding work is carried on with these and also feeding experiments.

With the dairy herd, owing to the use of excellent sires and the careful elimination of poor stock, the value of the herd is constantly increasing and its standard becoming more uniform. The herd is now made up of 67 head, 42 being registered Ayrshires and the remainder crosses.

The number of swine at the station is at present 46, but owing to the extremely high cost of feed and the difficulty of securing some necessary feeds, a great deal of experimental work could not be done during the year. Careful figures on the cost of production, however, have been kept. The total number of sheep at the station is now 99, and during the year 41 were sold. The production of wool amounted to 474 pounds.

With poultry the Barred Rocks and White Wyandottes are kept, and arrangements have been made for wider and more careful experimental work. Very little work was done with bees during the year, owing to the impossibility of getting a properly trained bee-keeper. One has now been secured, however, and arrangements have been made to increase the number of colonies and make bee-keeping a feature of the work at this station.

In field husbandry, a number of rotations are being carried on suitable for different styles of farming and for different characters of soil. Owing to the late seeding and unfavourable weather conditions, cereal crops did not yield as highly as in some other years. As in previous years, Huron wheat showed itself the best suited to this district, as did Manchurian barley and Banner oats, although the Daubney oat showed itself to be earlier than Banner and very productive. The new Liberty oat has so far shown itself as likely to prove very useful for special purposes in this district. Arthur peas yielded at the rate of 30 bushels per acre.

During the year an office building was put up, a great deal of stone removed from the fields and considerable drainage work done. The number of visitors to the station was very large. During a period of three days 3,000 farmers visited the station. A

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number of demonstrations and talks were given to these visitors, touching upon the agricultural needs of the district. As in past years, the station exhibited at many fairs and for the first time showed at the Quebec exhibition with Percherons, which carried off a number of first prizes for different classes.

EXPERIMENTAL STATION, CAP ROUGE, QUE.

Season.—The six months during which plants grow in central Quebec were warmer, drier, brighter than the average of the last nine years; the frost-free period lasted 138 days, about the usual length, from May 6 to September 21.

Crops.—Spring wheat, oats, field peas, potatoes, hay, celery, pumpkins were very good; silage corn, mangels, pastures, table corn, garden beets, cucumbers, squash, plums, grapes, annual and perennial flowering plants were good; field carrots, swede turnips, garden carrots, cabbage, cauliflower, tomatoes, apples were medium; egg plants and melons were practically a failure.

LIVE STOCK

Horses.—There were 69 head, 63 of them pure-bred French Canadians, at the end of the fiscal year; 55 at the horse farm and 14 at Cap Rouge. These animals are used for work for experimental breeding and housing.

Dairy cattle.—The herd numbered 67 head, 60 of them pure-bred French Canadians, on March 31, 1921. They are kept for milk production, experimental breeding, feeding, housing and management. There are more animals qualified for Record of Performance at Cap Rouge than in any other herd of the breed.

Sheep.—The flock of pure-bred Leicesters numbered 105 head at the beginning of April, 1921. They are used for experimental breeding, feeding and housing.

POULTRY

Laying contest.—The Quebec Laying Contest was continued at this station: 200 Barred Rocks and Rhode Island Reds are in the pens including those entered by the station for registration purposes.

Farm flock.—An average of 187 Barred Rock layers was kept during the year and the egg yield jumped from 86 in 1919 to 133 in 1920. The birds are kept for experimental breeding, feeding and housing; a comparison was also made of egg preservatives.

FIELD HUSBANDRY

Crop management.—The projects on hand include cost of production of field crops, rotation work, rates of sowing oats, also timothy and clover, yield of hay after different kinds of nurse crops and after different rates of sowing oats.

Soil management.—This is an investigation into the relative merits of spring and autumn ploughing for silage corn.

GRAINS

Variety tests.—These comprise spring wheat, barley, oats, peas, beans, and flax. Huron, Manchurian, Banner, Arthur, Norwegian, Novelty are the ones which have done the best to date.

Selection.—This is going on with Huron wheat, Manchurian barley, Banner oats, Arthur peas; very encouraging results have already been obtained with the two former.

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FORAGE CROPS

Variety tests.—These take in sugar beets, mangels, swede turnips, carrots, corn, red clover, Giant Half Sugar White mangel, Good Luck Swede turnip, Mammoth White Intermediate carrots, Longfellow corn have done well at the station.

Selection.—Selection experiments are under way with Good Luck Swedes, Quebec Yellow corn, and Grimm alfalfa.

Cultural work.—Different methods are compared of producing red clover seed, also mixtures of grasses and clovers for hay and pasture.

HORTICULTURE

Fruits.—Besides the variety tests of apples, cherries, pears, plums, grapes, black, red, white currants, gooseberries, raspberries, strawberries, there is breeding work going on with most of these; also such investigations as relative merits of different cover crops, cost of establishing a Wealthy-McIntosh orchard, and comparison of methods of planting strawberries.

Vegetables.—Fifty-three projects receive attention, for vegetables alone. Most of these refer to variety and strain tests, selection, and cultural experiments with asparagus, beans, beets, cabbage, carrots, cauliflower, celery, corn, cucumbers, muskmelons, onions, parsnips, peas, potatoes, pumpkins, rhubarb, squash, tomatoes, turnips, watermelons.

Ornamental plants.—Notes were taken during the year on over seven hundred varieties and strains of annuals, perennials, bulbs, shrubs and trees.

EXTENSION AND PUBLICITY

Exhibitions.—Instead of having extensive and costly displays at the provincial exhibitions, entries were made in competition, in the ordinary classes. One hundred and thirty-nine prizes were won on horses, poultry, grain, forage plants, fruits, vegetables and flowers.

Publicity.—Besides articles for the press, over five thousand circulars and bulletins were distributed during the year.

EXPERIMENTAL STATION, LENNOXVILLE, QUE.

The spring of 1920 was quite backward, the first seeding being done on May 13. There was an excessive amount of rain during July, followed by one of the mildest winters on record in this district. The ice broke up in the St. Francis river on March 10, causing considerable damage to fences on the Farm.

The foundation has been laid for a Shorthorn herd in conjunction with an Ayrshire herd already at the Farm; all of our stock in these two herds are under the Accredited Herd system.

The swine at this Station comprises the Yorkshire breed, with which breeding and feeding experiments are being carried on.

Sheep experiments are being conducted to show the improvement in the grade of wool that can be brought about in selection work.

In poultry, lines of work such as trap-nest selection for improved production, and early vs. later hatched pullets are being conducted.

Work in horticulture consists of testing out different varieties in orchard, small fruits, vegetables, perennial and annual flowers; testing of spray preparations for the control of blight and insects on potatoes and other crops.

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There was built this year an implement shed 125 by 35 feet, and there was added to our Station in the course of the year 160 acres which was formerly occupied by the Soldier Settlement Board as a training centre.

A considerable amount of improvement work was done at this Station such as fencing, clearing land and road work.

EXPERIMENTAL STATION, LA FERME, QUE.

The spring preparation of the land commenced early but operations were prolonged on account of wet weather until the 15th of May. After that date, seeding could be done without any difficulty. Up to the month of July, all grains and especially hay, roots, and garden crops, suffered much from drought, precipitation being 1.17 inches for May and 0.81 inches for June. From the 13th of May to the 19th of September, the thermometer fell to freezing point on one occasion, the first of July, but very little damage was done. It has been noted that temperatures are gradually becoming more moderate in this district. In 1918, the thermometer fell below freezing in every month of the year except July, but in 1920, there were practically four months without frost. The fall was especially fine, and all crops were got in without trouble or damage.

In spite of the drought which kept back the growth of the hay, an average crop was harvested, about one ton to the acre. On the Experimental Station, there were grown thirty acres of oats, one acre spring wheat, three acres of barley, one acre of peas, which gave yields respectively of 20, 12, 15, and 7 bushels per acre. Twenty acres were sown in oats and peas for ensilage, also four acres of carrots, turnips, and forage beets. The carrots and forage beets were a total failure, but the turnips gave very satisfactory yields. The experiment with sunflowers gave a yield of 7½ tons per acre. This plant seems to give good promise of replacing satisfactorily Indian corn for ensilage, as the latter cannot be grown here.

All the garden crops did well, except tomatoes and beans, which were damaged by the light frost of July 1. Yields were above the average.

On March 31, 1921, the herds comprise: four milch cows and five heifers, all cross-bred, and one pure-bred Ayrshire bull; twenty-seven ewes, cross-bred, and 1 pure-bred Cheviot ram; sixteen Yorkshire swine; nine work horses, and two drivers.

A one-hundred-hen poultry house and four colony houses were built during the year. One hundred pullets, an incubator and two brooders were bought during the winter of 1921. Hatching operations will be carried on in the spring and also some experimental work.

About five acres were cleared and four acres tile drained.

Besides the construction of the poultry house and the colony houses, the superintendent's house was repaired; the houses formerly composing the internment camp were torn down and the lumber therein saved for future building; one old house was made into a piggery, and four were repaired to make dwellings for certain Farm employees.

Some of the Station products were shown at the district fair at Amos, and attracted considerable attention.

EXPERIMENTAL STATION, KAPUSKASING, ONT.

Following a very severe winter the spring of 1920 opened very early, seeding operations commencing May 10, the earliest date for seeding since the inception of this Station. All spring grain matured well and gave good yields.

A herd of sixty cattle are maintained at this Station, made up of Ayrshire and Shorthorn Durhams, two pure-bred bulls being used in the grading up of this herd, from which very satisfactory results are being obtained.

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The sheep flock maintained at this Station has given very satisfactory returns, the lamb crop for the past year being exceptionally good.

Nine registered Yorkshire sows are kept at this Station, the progeny being used for experimental purposes, and for sale to the settlers in this district.

Three colonies of bees were kept during the past year from which very gratifying results were obtained; both the quantity and quality of product shows that northern Ontario has great possibilities as a honey producer.

Experimental work was carried on during the past year both with calf feeding and pig feeding for beef and pork production.

Seventy acres of land was stumped and burned over; owing to a shortage of labour in this district during the fall of 1920 this land was not broken.

One hundred acres of stump land was sown for pasture purposes, a very fine stand of clover being obtained.

A Buckeye traction ditcher was used in connection with land drainage during the past year with very satisfactory results.

Building operations during the past year consisted of remodelling of bungalow for double cottage, remodelling of piggery, construction of a new apiary and bee yard, as well as a small oil-house.

During the months of September and October an exhibit was shown by this Station at the following places:—

Fort William, Sault Ste. Marie, Thessalon, New Liskeard and Cochrane, Ont. Great interest being taken both in the models of farm building shown, as well as in the grasses, grains and clovers exhibited by this Station, special mention being made at all the fairs regarding the exhibit of red clover.

EXPERIMENTAL STATION, MORDEN, MAN

The winter of 1919-20 was most severe. It set in early, leaving large areas of roots and potatoes unharvested and until late spring there was no break in extreme cold accompanied by frequent storms. Spring, however, opened favourably, but later the heat was intense with practically no precipitation. This caused many partial or total failures of crops. There was no frost before September 30 and no damaging frost before October 19, while the entire fall was dry and fine, permitting of a great deal of fall work being done. The winter of 1920-21 has been extremely mild for Manitoba, permitting of the carrying on of many operations which, in the ordinary winter, would have been impossible.

LIVE STOCK

No experimental work with horses has yet been undertaken at this Station, the present force, eight in all, being kept solely for the farm work. The foundation for a herd of Ayrshires has been purchased and have done well during the year, the cows being entered in the Record of Performance and have demonstrated that they will qualify.

An experiment in steer feeding with thirty steers was carried on in the fall of 1919-20.

With sheep, the grading-up experiment has been continued and great improvement is already noticed in the offspring of the grade ewes with which the work was started. They are becoming Hampshires to all appearances, both in character of wool, blocky type of lambs and the characteristic Hampshire markings.

A beginning was made with poultry in the spring of 1920. A number of colony houses were built, together with two permanent hen houses. The work will be confined to the two breeds, Rhode Island Reds and Barred Rocks.

No work has yet been commenced with swine or with bees, but a start with the latter is to be made this spring.

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FIELD HUSBANDRY

In field husbandry, although the yields of hay and grains were light, the former was sufficient for the live stock on the Station and the quality of the grains was excellent. A large number of varieties of corn were planted and all these matured seed, due to the very hot summer. Sunflowers were again grown for ensilage and seemed to be relished by the cattle more than in the previous year.

HORTICULTURE

Horticulture is the leading line of work at the Morden Experimental Station. Some 90 acres were under cultivated horticultural crops, comprising 40 acres of orchard, 20 acres of potatoes, 10 each of peas and beans, with the remaining area taken up by the nursery small fruits and vegetables. The area under orchard was not extended during the season, but a great deal of replanting was done where trees had died. This replacing must be continued from year to year in the endeavour to eliminate too tender varieties and replace them with hardy stock. The problem of protection of the prairie orchard is being studied from every angle and data are gradually being accumulated. One of the great difficulties in orchard work in this district has been damage from rabbits. These appear to be very difficult to control but a number of ways, such as trapping, poisoning and shooting are being tried.

The endeavour to secure varieties of small fruits suitable for the middle west is being continued. Raspberries appear to be the most promising small fruit for a steady crop yielder. Black currants and gooseberries have not done well in this district and strawberries are uncertain, owing to the difficulty of supplying sufficient moisture at fruiting time.

With vegetables, the character of the season is the controlling factor. During a dry season they tend to mature too early and the gardener is obliged to depend wholly upon natural rainfall as the well water in this district is so alkaline that it will kill plants outright.

A special feature of the work at the station has been potato growing, as there seems a great future for this crop in this district. Over twenty acres were in potatoes last year at the Station but even this did not supply the present demands. It is believed that experiments will show that only early sorts can be recommended for a reliable crop each year.

With flowers, it is felt that the perennial is the most suited to the prairie garden in that they persist year by year and the problem of transplanting during the heat is overcome. Practically all bulbs do well. Many varieties of roses have been tried and with some success, although they require very special protection during the winter.

FARM IMPROVEMENTS

During the year the house for the superintendent was completed, two permanent hen houses built and a number of colony houses; also a root house to accommodate about 2,000 bushels of potatoes. The old barn was remodelled to a certain extent to accommodate the dairy herd. A great deal of road making has been done since the McLain property was required, connecting the farm with the village of Morden and permitting the extension of the street from the village to the farm. A considerable amount of fencing was also done in this connection.

An exhibit was made at the Morden fair and at a number of other points in southern Manitoba and the superintendent was able to assist with agricultural meetings of boys' and girls' clubs, garden competitions, etc., etc. The number of visitors to the Station showed a marked increase over the previous year.

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EXPERIMENTAL FARM, BRANDON, MAN.

THE SEASON

The spring of 1920 was backward, and there was no work on the land until the last days of April. However up to June 10, crops had made an exceptionally good growth, but a very serious drought ensued, lasting until July 22. This burned up the grain crops badly, causing them to head up and ripen too quickly, so that a good crop was impossible. Rainy weather in the fall made threshing operations very difficult, but these rains were very helpful to corn, roots and sunflowers, which gave excellent crops. Favourable weather in the fall gave an opportunity for fall ploughing and the completion of threshing.

LIVE STOCK

Breeding work with dual-purpose Shorthorns was continued along the same lines as in previous years.

Tests were undertaken early in 1921 to determine the feeding value of sunflower silage. These tests are not completed at the end of the fiscal year but they tend to show that the sunflowers made a very satisfactory quality of silage, nearly equaling that made by good corn in palatability and feeding value.

An experiment was conducted in the winter feeding of steers to determine the feeding value of recleaned elevator screenings. The gains made on screenings and bran cost \$3.51 less per one hundredweight than those made on the oat chop. While these results do not necessarily prove that screenings are better feed than oats, they at least show the former to be a very valuable feed, comparing favourably with our standard grains in that regard.

The Yorkshire breed of swine is kept at Brandon. Crossbreeding tests for pork production have been undertaken and in the fall of 1920 sows were bred to Duroc-Jersey and Berkshire boars.

The feeding of recleaned elevator screenings to pigs was continued and tends to confirm previous findings that this feed is equal to barley for feeding swine.

The flock of sheep includes a few pure-bred Oxford Downs but is composed chiefly of grades. Grading up experiments are being conducted with these.

With horses, breeding operations are conducted with the Clydesdale, the Farm co-operating with neighbouring farmers in the formation of a horse breeders' club.

POULTRY

The Barred Plymouth Rock and White Wyandotte breeds are kept. The object of the breeding operations are to develop good utility strains of these breeds that shall excel in egg-laying propensities. Pedigree breeding is carried on with the best layers in order to permit of the breeding from these. The first Manitoba egg-laying contest was completed on October 29, 1920, and the second contest commenced on November 1, 1920, is still going on at the close of the year.

FIELD HUSBANDRY

In field husbandry a number of rotations suitable for different types of sod are being carried on, as well as a very elaborate series of cultural experiments. Variety tests with cereals, forage crops, vegetables, fruits and flowers were continued and much additional data gathered.

BUILDINGS

Building operations were of a minor character, consisting only of painting and repairing.

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EXHIBITS, VISITORS, PUBLIC MEETINGS

Exhibits of Clydesdale horses and milking Shorthorn cattle were made at the Manitoba provincial exhibition, as well as horticultural exhibits at the above exhibition and at the Brandon show. The superintendent attended a large number of agricultural conventions and farmers' meetings and gave addresses on agricultural topics, and also acted on numerous occasions as judge of live stock and farm products. He also served as director on the boards of the Manitoba Provincial Exhibition and the Manitoba Winter Fair and as president of the Manitoba Swine Breeders' Association.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.

The crop year of 1920 was not a favourable one in this district. Seeding did not commence until the last week in April and was not general until the first week in May. The late seeding, followed by high winds and hot dry weather during the months of June and July, made the yield of all crops the lightest for some years. A frost on August 20 stopped the growth of the corn and cut the yield of this crop at least a third. Root crops were well up to average and late fall rains made a large amount of pasture available in the stubble during the fall and winter.

HORSES

There are thirty-four horses on the Farm and of these seventeen are pure-bred Clydesdale mares and fillies, one is a promising yearling Clydesdale stallion of our own breeding and the remainder are work horses and grade colts. Five good foals were raised during the year.

CATTLE

The herd consists of sixty-eight pure-bred Shorthorns. Three herd bulls are kept and six young bull calves are on hand, the remainder of the herd being good type females. All surplus stock finds a ready sale at good prices to farmers who are desirous of improving their live stock.

The experiment in feeding sunflower silage was carried on again this year and the results completely corroborated last year's findings, namely, that as regards palatability and feeding value it is practically equal to corn silage but has a stimulating effect on the kidneys.

SHEEP

The flock of sheep numbers one hundred and eleven mature sheep and a number of early lambs. Of these ninety-six are breeding ewes. Thirty-one of these are pure-bred Shropshires, twenty-nine are grade Shropshires and thirty-five grade Oxfords. Five pure-bred yearling ewes, four Shropshire rams and one Oxford ram complete the total of mature sheep.

An experiment in finishing lambs for market was carried on during the year. One lot of lambs was finished for the Christmas market and another for the Easter market. Both lots were well finished and sold at a premium of one and one-half cents a pound over the market, showing a substantial profit over the cost of feed.

SWINE

The breeding herd consists of one Yorkshire and nine sows and two Berkshire boars and twelve sows. In addition to these there are sixty-seven feeders.

The results of experimental work in the housing of fall pigs indicate that a good straw shelter is in some respects preferable to an expensive piggery. This is borne out by the result of previous experiments with breeding sows.

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POULTRY

The White Wyandotte is the breed kept, and some excellent egg records were obtained. The laying contest started in the fall of 1919 was successfully completed and a new one started.

FIELD HUSBANDRY

In field husbandry, work was continued with rotations and also with the cultural experiments. The usual variety test work with cereals, forage crops, fruits, vegetables and ornamentals was continued.

BUILDINGS

A two-hundred hen house was constructed as an addition to the poultry plant. During the year it was found desirable to move the plant pathological laboratory to a new and more suitable site nearer to the office.

EXHIBITIONS AND VISITORS

An exhibit of Shropshire sheep was sent to three of the leading western shows where they attracted very favourable attention and won a number of prizes.

During the summer, with the efficient assistance of the Saskatchewan Department of Agriculture, a number of excursions were arranged to the farm and a large number of farmers took advantage of these definite days to visit the farm although it was not possible to secure excursion rates on the railroad.

DOMINION EXPERIMENTAL STATION, ROSTHERN, SASK.

The season of 1920 was very favourable for horticultural work due to there being no frost recorded from May 5 to September 15, which allowed the ripening of tomatoes, pumpkins, squash, cucumbers, melons and plums. The yield of strawberries, raspberries and currants was above the average. Small fruits have yielded well every year since the first plants began to bear in 1914. There is no good reason why sufficient small fruits should not be raised in Northern Saskatchewan to supply at least the home demand.

In 1914 two Holstein dairy heifers were purchased and they with their increase now number thirteen cows and heifers.

The flock of sheep now number fifty ewes and two rams. They are developed from a flock of one hundred range bred ewes and four Leicester rams purchased in December, 1915, and show a marked uniformity in type of high quality and showing strong Leicester characteristics.

The season of 1920 was the third successive dry season for the Rosthern district but the soil drifting at the Experimental Station was not so bad as in the two previous seasons. In 1920 the fall ploughing of the previous year was cultivated with a broad tooth cultivator and seeded without any further treatment. This did not form an ideal seed bed for the surface was left lumpy but it did not drift. The spring ploughing was packed with a sub-surface packer and seeded and did not drift. The difference in treatment of the soil from previous years was the absence of the use of the harrows either before or after seeding and the absence of the surface packer after seeding.

The experiment in rotation of crops showed the greatest profit from the six year rotation involving summer-fallow, wheat, wheat, oats seeded down, hay and pasture.

In all rotations the seeding for hay and pasture has been a failure for the past three years when the seeding was done with a nurse crop but not when seeded alone in a good seed bed.

Sunflowers were given a trial on a larger scale in 1920 than previously. Five acres were sown on summer-fallow on May 25 and cut on August 28, and yielded at

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the rate of 6 tons 658 pounds of green ensilage per acre and two acres sown on spring ploughed stubble on May 10, and harvested on September 15, yielded at the rate of 8 tons 795 pounds per acre. Those on the stubble land had 32 days longer growth. Some sunflowers left standing were unaffected by frost till a temperature below $26\frac{1}{2}^{\circ}\text{F}$. was reached.

The comparison of varieties of grains in small plots on summer-fallow was unsatisfactory because of the dry weather. The different plots were differently affected by the drouth but in half acre plots on very even stubble land the yield of three varieties of wheat were Ruby, 15 bushels 34 pounds; Preston, 13 bushels 16 pounds and Marquis, 7 bushels 52 pounds.

EXPERIMENTAL STATION, SCOTT, SASK.

Spring opened late. Seeding commenced the last day of April; favourable weather permitted rapid progress, but shortage of help, and an increase in the acreage for green feed made the completion of seeding late. Warm, dry weather in July decreased crop yields. Rains in late July and late August improved the condition of late maturing crops. Frost did less damage than usual. Insect pests were more numerous. The sugar beet webworm destroyed a field of peas and damaged sunflowers and field roots. The larvæ of the diamond back moth also injured the tops on the turnips and mangels.

Four Percheron mares were bought and this number has since been increased by one filly foal. Six young Yorkshire sows were received from the Lacombe Station and a boar of the same breed from the University at Saskatoon. Future work with swine will be mainly along the line of determining the value of cross-breeding for producing market hogs. Steer fattening experiments have been conducted and dehorning steers has again shown a loss. Sunflower silage fed to steers has not shown up to the same advantage this year as in the previous year. Lambs fed on silage made cheaper gains than where fed turnips or where no succulent food was supplied.

White Wyandottes have been included in the poultry experiments. In addition to the regular experiments with poultry, pedigree work was started. Good records were secured from some of the best pens of Barred Rocks.

Records show that out of the twenty-seven fields seeded down to grass in the past nine years only on three fields has the grass been a failure. These were all on one rotation and the failure was no doubt due to an unsuitable arrangement of crops and the presence of weeds. Seeding down with a nurse crop has proven the most profitable system. With a view to making them more complete modifications have been made in some of the cultural investigational experiments.

Yields of cereals were fair, the later maturing varieties giving the best returns due possibly to having been more benefited by the late summer rains. A field of peas yielded $22\frac{1}{2}$ bushels per acre. On the plots, spring rye yielded 56 bushels; Banner oats, 58; Kitchener wheat, 36; two-rowed barley again outyielded the six-rowed.

Good crops of grass and grass seed were obtained, one field yielding at the rate of 879 pounds of western rye grass seed per acre. After fanning this seed was sold at 12 cents per pound. Sweet clover produced two good cuttings of hay. Oats, and oats and peas again outyielded millet and Sudan grass. Sunflowers yielded as high as 19 tons per acre green weight. Field root crops were injured by the webworms and, consequently, yields were decreased.

Absence of the usual severe spring frosts permitted the small fruit to set. The Eclipse variety of black currant yields averaged over nine pounds of fruit per bush.

Native Manitoba plum trees thrived well and gave a medium crop. In the vegetable garden, tomatoes, potatoes, and celery yielded much above the average. Trees and shrubs in the garden made a fair growth and flowers bloomed freely.

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During the year a threshing barn was erected and two dwelling-houses were moved over from the town.

With the co-operation of the Provincial Department of Agriculture four excursions were arranged to the Station in early July. A large number of farmers visited the Station during these days.

An exhibit from the Station was sent to the summer fairs in the northern parts of the province.

EXPERIMENTAL STATION, LETHBRIDGE, ALTA.

THE SEASON

The crop season of 1920, although by no means as disappointing as 1919, was not a satisfying one. It started out with great promise. The precipitation for the last four months of 1919, September to December, which would influence the amount of moisture carried over winter in the soil, was good. It amounted to 5.63 inches, as compared to a normal precipitation of only 3.64 inches for the same period. During the winter the land was covered with snow almost continuously, something unusual for the district, which prevented the soil from drying out. April, which is ordinarily a dry month with us, was unusually wet, 4.37 inches of moisture falling. No work on the land was possible that month. General field operations on the land did not start until the 4th of May, a month later than usual.

The crop season, therefore, started out well with plenty of moisture in the soil.

Seeding in southern Alberta, although getting a late start, was pushed with vigour and was completed only about two weeks later than usual. Owing to lack of time the tendency of farmers generally was doubtless to do less work in the preparation of the seed bed than was desirable. From the 1st of May on, the rainfall was so scanty, except in a few favoured localities, that the promising outlook for grain crops generally did not materialize. The early moisture produced good grass on the ranges and livestock picked up rapidly after the severe winter and were in excellent condition in the fall.

There were no severe spring frosts. The latest one was on June 3, when three degrees of frost was recorded. Fortunately, there was a warm late fall. No frost was recorded until the 19th of September and the first killing frost did not occur until October 17. In consequence of this, late sown crops on irrigated land had ample time to mature. Owing to the generous supply of moisture received early in the spring, grain made rapid and promising progress until continued dry weather in June interfered. On the 8th of June an unusually heavy wind caused material loss by soil drifting over a rather large area west and north of Lethbridge. Rains in July which were local in character were sufficient in some localities to produce excellent crops, but in the greater portion of the southern part of the province they were so light that crops generally failed to till properly, the consequence being that the returns at threshing time were disappointments in nearly all cases.

One of the outstanding points about the season that affected the livestock interest seriously was the fact that April was so unusually stormy. It was necessary to feed until May. On account of the scarcity of feed and the unprecedented high prices that had to be paid for it, stock men of all kinds were badly hit.

LIVE STOCK

Horses.—At the present time there are twenty-three head of horses on the Station, made up of fourteen work horses and drivers and nine young horses, the latter ranging in age from one to three years. As in the past, all of the horses were wintered in a corral with an open shed except the drivers and two draught teams. This method of

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wintering has proved to be entirely satisfactory. All of the horses improved in condition during the winter and were in excellent shape to begin the spring's work. The saving in labour required in feeding and caring for horses wintered in this way as compared to stabling is considerable.

Cattle.—A feeding test with forty head of steers was begun on January 24 to test the comparative value of cut oat straw and alfalfa as roughage, compared with uncut alfalfa hay as roughage. The oat straw used was of good quality and the mixture consisted of equal parts by weight of straw and alfalfa. Our results confirmed the returns obtained in previous similar experiments. The lot fed on the cut mixture did slightly better, making an average daily gain from January 24 to March 31 of 2.5 pounds, while the lot fed on straight alfalfa hay as roughage made an average daily gain of 1.94 pounds. Four milch cows are kept to supply milk to employees on the Station.

Sheep.—The first year's work in the experiment of wintering sheep on irrigation farms and pasturing them during the summer on the forest reserve was completed in October, 1920. Owing to the hard winter and extremely high prices for hay, the financial returns were disappointing. This conforms to the experience for the year of all sheep men in this part of the province. If the feed was charged at normal prices the returns would have been satisfactory. The sheep gave an average return of 9 pounds of wool per head. The increase from lambs was 102 per cent. The sheep were moved by rail to Coleman in the Crowsnest forest reserve June 23 and were returned October 6, 1920. During the summer they made marked gains, especially the lambs. These averaged nearly 10 pounds per head heavier in the fall than lambs of similar breeding pastured on the prairie ranges. Two-thirds of the best wether lambs were shipped to market in August and averaged 73 pounds off cars in Calgary. The losses during the summer were almost negligible until the week the sheep were shipped out, when in a snowstorm piling took place and unfortunately sixty head of ewes and lambs were smothered. The lower cost of feed for the winter 1920-21 has reduced materially the expense for the second year of the experiment. During the lambing season that is now in progress the ewes are being fed sunflower ensilage and this noticeably increases their milk flow. This feed will be continued until they are turned out on grass. The results of this experiment are being followed closely by many farmers on irrigated land who are anxious to go into the sheep industry but are deterred from so doing on account of the lack of summer pasture.

POULTRY

The results of experiments with poultry for the past year have been satisfactory. The barred Plymouth Rock breed is the only one kept. All pullets are carefully trap-nested. Of the pullets that finished their first laying year 27 per cent have records of 200 eggs or over and 40 per cent have records of between 150 to 200 eggs for the year. The demand from farmers for cockerels is greater than we can supply, as is also the demand for hatching eggs. Good progress is being made in the pedigree work. The provincial laying contest is being conducted at the Station. Twenty-one pens of 10 birds each are entered for the current year. They have all averaged well but there have been no outstanding records made.

BEES

The work carried on with bees is attracting more and more interest each season, especially by residents in the irrigated areas where alfalfa is extensively grown. In the beginning of the season our apiary consisted of nine colonies. Swarming was successfully prevented during the summer. With the exception of one colony made by division and later disposed of, no increases were made. The nine colonies produced 891 pounds of extracted honey. The most produced by a single colony during the

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season was 214 pounds, a distinct decrease from the previous year, indicating that the season was not quite so favourable. Two 2-pound packages were purchased in May to test the possibility of importing bees in this manner from long distances. Both did well and produced some surplus honey. Wintering experiments were continued. Examination the last of March revealed the fact that the colonies wintered outside in "wintering cases" came through better than those wintered in a "dug out" cellar.

FIELD HUSBANDRY

On the dry land the yield of grain was only fair. Damage to a limited extent was caused by soil drifting. Returns from the fields of hay and pasture were light. On the irrigated land alfalfa gave the usual satisfactory returns. A five-acre field of sunflowers raised for ensilage planted on spring ploughed stubble land yielded slightly over 17 tons to the acre. The yield of this crop was reduced materially due to the fact that it was impossible to get a satisfactory seed bed prepared owing to the unusual moisture of April followed by excessively hot dry winds in May.

As usual most of the field experiments were conducted in duplicate on the irrigated and non-irrigated parts of the Station. The comparative tests with the various rotations continue to furnish valuable information and data on the cost of production of field crops as well as to show the best arrangement of the crops.

CEREALS

All cereals in the variety test plots on the non-irrigated land suffered from soil drifting on account of their location on the farm. In consequence of this fact the comparative yields from the different plots are unreliable. Some plots received more injury from wind than others and the difference in yields was influenced more by this fact than by difference in variety. The yields on irrigated land were satisfactory so far as wheat, oats and barley were concerned. The different varieties of field peas were again affected by mildew which reduced the yields in a very material manner, the highest yielding variety, Prussian Blue, only produced at the rate of 17½ bushels per acre.

FORAGE CROPS

All classes of forage crops did well on the irrigated part of the farm. Those grown on dry land, although doing better than the previous season, produced very light crops.

Indian corn.—Of the 13 varieties tested "Comptons Early" gave the highest yield on non-irrigated land with slightly over 6 tons per acre. On the irrigated land "Longfellow" led with 17 tons of green feed per acre.

Roots.—All roots tested on the dry land gave very light yields. Of the 19 varieties of turnips tested Fredericton Good Luck gave the highest yield, with 28½ tons per acre on the irrigated land. The stand obtained of mangels, sugar beets, and carrots was poor and the yields were correspondingly light.

Sunflowers.—But one variety of sunflowers was experimented with, the Giant Russian. A test was made in thinning plants to 6, 9, 12 and 18 inches apart in the row with the rows 3 feet apart. The highest yield was from the plants left 6 inches apart which produced at the rate of 26 tons, 1,760 pounds per acre, while the lowest yield was from the rows thinned to 18 inches apart which produced 18 tons, 1,128 pounds per acre, indicating that heavy seeding is advisable.

Alfalfa.—On irrigated land field lots of alfalfa made their usual yield of from 4 to 5 tons per acre for the season. On dry land only that grown in rows produced hay. The seed crop was very light, only a few of the blooms set seed.

Pasture mixtures.—The tests with different mixtures of grasses on irrigated land were continued.

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HORTICULTURE

The vegetable crop on the dry land was fair; on the irrigated land good. Owing to the wet weather during April it was late before seed could be planted. The first put in was on May 10 on the dry land and May 20 on the irrigated land. Although getting a late start they made rapid growth and the warm September with no heavy frosts made it possible to mature a larger crop of such tender sorts as tomatoes, etc., than is usually the case.

The experiments on dry land demonstrated the importance of planting vegetables only on summer fallow land if satisfactory results are to be expected in a dry season. The value of a shelter belt of trees for the garden was well illustrated during the period in June when the heavy damaging winds occurred.

A light crop of apples was produced on the Saunders' cross-bred varieties. The Manitoba seedling plums bore well. The yield of fruit from currants, raspberries and strawberries was very satisfactory. All trees and bushes wintered well. The flowers both perennials and annuals made an attractive showing.

IRRIGATION

Interest in the development of irrigation in Southern Alberta continues to attract a great deal of attention. With the advancement of the new projects increased attention is being paid by farmers to the results of the experiment carried on on the irrigated part of the farm.

EXPERIMENTAL STATION, LACOMBE, ALTA.

In September, 1920, a superintendent was appointed at this Station to replace Mr. G. H. Hutton, who had resigned over a year before. The fact that the Station had been without a superintendent for so long, coupled with the fact that the assistant to the superintendent and several of the skilled men in charge of special lines of work were also changed at the same time, affected adversely the number of experiments carried on during the past year but plans have been made to counteract this during the coming season.

THE SEASON

The year 1920 was the driest in the history of the Experimental Station, the total precipitation being 12.415 inches, which is 5.541 inches below that of the average of the twelve preceding years which was 17.956 inches. Considering this, the yields of grain on the Station were very satisfactory, being 75.4 bushels per acre for oats and 37.86 bushels for barley. Hay crops and peas and oats for silage were more seriously affected by the drought.

LIVESTOCK

The horses at the Station were 22 in number, made up of 5 pure-bred Clydesdale mares, 2 pure-bred Hackney mares, 8 grade Clydesdale mares, 3 grade Clydesdale geldings, 2 grade Hackney geldings and 2 foals of 1920.

The beef herd consists of 57 pure-bred and 9 grade Aberdeen Angus cattle. Five animals from this herd shown at the Calgary Summer Fair, 1921, won seven prizes and Eliminator of Gwenmawr, was reserve champion.

The dairy herd consists of 36 pure-bred and 20 grade Holstein-Friesian cattle, among the former being outstanding individuals which have produced some most promising heifers. A number of extra good young bulls have been sold during the year to head dairy herds. Owing to the extremely dry summer, good pasture was never available and from the middle of August it was necessary to feed dry prairie hay. Under these conditions it was impossible to produce high milk records. Six cows are now entered in the Record of Performance test.

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Three breeds of swine are kept at this Station, namely, Berkshire, Yorkshire, and Duroc Jerseys. Extensive breeding work and feeding experiments are carried on.

At the close of the year there were 838 sheep on hand and extensive experimental work is being carried on in the management of sheep under range conditions and in grading up experiments, etc. In the grading up work, rams of the following breeds are used: Hampshire, Leicester, Oxford, Corriedale, Cheviot, Shropshire.

POULTRY

The work with poultry was hampered during the year by frequent changes in poultrymen, but late in the season a permanent man was secured. Of 271 chicks hatched in April, 206 were raised. Experimental work in breeding is carried on; likewise comparison of various breeds as to laying and egg-producing qualities, together with a wide range of feeding experiments.

Two cottages were erected by day labour under the supervision of the superintendent.

EXPERIMENTAL STATION, SUMMERLAND, B.C.

The seasonal records of this Station show 1.4 inches more moisture than during 1919. This moisture, however, came in the fall, September, 1.51, and October, 1.66, as compared with 1.0 inch in September and 0.61 in October, 1919, the total rainfall being 9.97 compared to 8.56 for 1919, and the amount during the four growing months of May to August, 1919, 1.97; 1920, 2.06. These rains came in small showers and only washed the foliage on the trees and did the land no good. Water was not plentiful during the season and crops suffered.

The spring of 1920 opened up cold and kept cold into June and a cold spell in July, from 19th to 25th, retarded ripening of such crops as tomatoes, peppers, melons, etc. Harvest season was fine, but cool, and corn did not ripen as well as previous years. The apple harvest, being a small crop, was taken off the trees before frosts came.

AGROSTOLOGY

Small amounts of stock seed of Giant White Feeding mangels were grown, also White Intermediate carrots. Stecklings were grown for the season of 1921. The different varieties of mangels, corn and carrots were tested and for bench land the Intermediate in both cases led again in yield and quality. In corn for silage, Northwest Dent and Longfellow proved best for this district. Grasses have given good yields, and again orchard grass and tall oats show their superiority over timothy in clover and grass mixtures. Preparations have been made for next year to carry on very definite work in seed production of alfalfa, regarding proper amounts and time of application of irrigation water. The inoculation of legumes is being carried on.

ANIMAL HUSBANDRY

The breeding work in swine progresses well. The Berkshire sows gave good litters and new blood has been introduced into the herd by a sow and boar from Lacombe, both unrelated. In the feeding of hogs, barley gave the biggest gains, screenings gave the most economical gains.

The flock of Cheviots and the ewes that are being graded up with them are not giving very good results. There is no range land on the Station and this breed will not stand being confined to crowded quarters. Goitre was well controlled last lambing season by the use of Potassium Iodide.

Steer feeding work was again carried on, corn v. sunflower silage v. roots. Good gains were made and steers were a very uniform lot.

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BEES

Of the five colonies of bees packed away in the fall of 1919, only three came out alive and one of these was so weak that it had to be united. The season was very poor and beyond the amount of honey necessary to carry these colonies through the winter, very little surplus was taken. A building in which to store equipment is now available and it is planned to expand in this division next year.

CEREAL DIVISION

This work it is hoped to carry on under various amounts of water per acre next year. Owing to dry year yields were low, this rotation will begin its second course next year, and yields should prove interesting. Clover and grasses are being used in this rotation as the hay crop.

FIELD HUSBANDRY

This division is being carried under a seven-year rotation with alfalfa as the hay crop. The most successful varieties from the Cereal and Agrostology Divisions will be tested out under field conditions in this rotation. When more land is available this division should be greatly increased. Amounts of water are being kept on the alfalfa fields and grain and hoed crops.

HORTICULTURE

Owing to the very dry fall and spring of 1919 and 1920, there was winter injury in the orchards and in some very dry places winter-killing. Orchards did not make as much growth as former years and show signs of fruiting this year. The orchards under various cultural methods continue to give object lessons in the necessity of nitrogen and humus in Okanagan soils.

Vegetable variety work is carried on in all lines suitable to this district under a distinct vegetable rotation. Progress is being made in beautifying the grounds of the Farm and plans for next year are made to improve the grounds round the boarding-house and the cottages. Some small lawns were established round the office and meteorological station. Flower seeds were again taken, but the cold season was against the ripening of the later varieties. The stone fruit orchards are in good condition and show signs of a good fruit crop. One of these will be put into permanent alfalfa this spring, the other brought on under hairy vetch.

POULTRY

The laying stock consists of 350 White Wyandottes. Birds have all been trap-nested during their pullet year and any undesirable birds, or birds which fail to lay a minimum of 150 eggs during their pullet year, are culled out. There are several pens of pedigree birds from which it is hoped to build up a strain of heavy layers, the health and vigour of the bird never being lost sight of. During the spring a total of 1,018 chicks were hatched out, tests being made with three makes of incubators and natural incubation.

FALL FAIRS

The exhibit from this Station was taken to Kelowna, Armstrong, Penticton, Naramata and Peachland. The superintendent attended conventions and meetings at Nelson, Lethbridge, Hullcar, Victoria, and a lecture tour of the Valley and Vernon Convention of Western American Horticulturists.

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EXPERIMENTAL STATION, INVERMERE, B.C.

The year just past has been very mild, no extreme temperatures being recorded, and the average mean temperature being above the average. The precipitation during the year was the lowest on record, being 9.32 inches, as compared with 12.45 inches, the average of the past seven years. The spring was backward, but the ground worked up very well, and when the warm weather came towards the end of June the crops went ahead rapidly. All crops were harvested under ideal weather conditions.

No experimental feeding with horses and cattle has been undertaken. The cost of wintering sows from the time they were bred until the young pigs were six weeks old was \$16.63 per sow.

On the irrigated rotations good results were obtained with oats, wheat, clover and potatoes. Cutworms were troublesome on the root plots. With forage crops clover and grasses have out-yielded alfalfa and grasses on the three years average. Dry land crops were a failure.

The variety tests with cereals and peas showed up well this past season. Huron wheat, Banner oats, and Guymalaye barley heading the cereals. Farmers would be well advised to grow more field peas, which give such excellent results in the district.

Some excellent results were obtained in horticultural work during the past season. Record yields of potatoes and tomatoes were produced. Variety tests with garden seeds were continued, and several selections and strains are being developed. Tree fruits will never be a commercial proposition in this district. Varieties such as Wealthy, Yellow Transparent, Rupert, Dudley, Okakena, Charlamoff and Pinto can be grown for home use. Fair yields were obtained from bush fruits. Many perennial and annual flowers were tested, and showed bloom from June to October.

Barred Rocks, White Wyandottes, Bronze turkeys, Toulouse and African geese, and Muscovy and Pekin ducks are kept on the poultry plant. Pedigree trap-nesting is being continued and interesting returns are being made from the flock.

The apiary numbered nine colonies in the spring. These yielded an average of 90 pounds of honey per hive, valued at \$42.30. The net return per colony after deducting loss and cost of sugar fed was \$34.61. The Kootenay case is giving every satisfaction, and apiarists should give it a trial as it has many fine features.

The Station exhibit was shown at six local fairs, and a great deal of interest was manifested in this branch of extension work. An increasing number of visitors go over the farm every year. This past season the first farmers' picnic was held, and it is planned to make this an annual event.

EXPERIMENTAL FARM, AGASSIZ, B.C.

The month of April, 1920, was cool, cloudy and very wet. The rainfall of 9.95 inches was a record for the month. May was not so wet but was cool. These weather conditions caused a late, backward spring. June was also the wettest for twenty years and during this month crops and weeds made rank, rapid growth; the latter were very difficult to control owing to the continuous rainfall. July, August, and the first week of September were dry and hot. This weather afforded better conditions for weed control, allowed the harvesting of an average crop of hay in excellent condition, ripened the cereals somewhat too rapidly for heavy yields, but made harvesting a rapid process and allowed some of the early grain to be threshed. On September 8 the rains commenced and continued almost without ceasing to the end of October. About fifty per cent of the grain in the Fraser Valley was destroyed in the stook, many potatoes rotted in the ground while harvesting of corn and roots was a difficult task. The fore part of November was dry thus affording good conditions for completing the root harvesting. The winter was mild, cloudy and wet. The closing days of March gave every indication of an early spring. The heavy rainfall in June followed by the

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heat of July caused the Fraser river to flood. These floods, coupled with the heavy rains of September and October, were the direct cause of the loss of several thousand dollars worth of crops. The total precipitation for the year was 87.67 inches, a record for all years in the history of the farm.

A nice group of Clydesdale females is now on the farm. It consists of four mature mares, three two-year-olds, one yearling filly and one horse colt. There are also three grade geldings, a grade mare and a driver.

The pure bred herd of dairy cattle is about the same size as last year, i.e., 48 head. The grade herd, however, has been reduced to 15 head, making a total of 63 animals. Six very good Record of Performance records were completed, two of these being made by two-year-old heifers. The four mature cows averaged 18,131 pounds of milk and 770 pounds of butter, the heifers 13,543 pounds of milk and 650 pounds of butter. In experimental feeding corn silage gave better returns than sunflower silage. wet brewers' grains helped to decrease the cost of milk production when substituted for half the dry grain ration as fed at that time, and mangels produced cheaper milk than potatoes when valued at the same price. The dairy work followed much the same course as previously. Stilton, Cream and Wansleydale cheeses were manufactured. Many samples of milk sent in by dairymen were tested for butterfat content.

A show flock of Dorset Horn sheep was exhibited at the Portland International Stock Show held during November. The sheep won seven first prizes out of a possible eight as well as both grand champions. At the close of the year the flock numbered 90 head. Twenty lambs, the oldest one born January 6, were sold for the Easter market at \$14.60 each. There appeared to be only a limited demand for Easter lamb this season. The 1920 wool clip, amounting to 632 pounds, was handled by the Canadian Wool Growers.

At the end of the year the Yorkshire swine herd is composed of 2 boars, 13 breeding sows, 36 young pigs and 19 feeders. In experimental hog feeding work, the self-feeder method produced greater gains than the ordinary trough method, but the latter produced the cheaper pork where labour was not a consideration. In comparing varying quantities of skim-milk for young pigs, eight pounds per pig per day produced the greatest gains, while half that amount gave the most profitable returns.

The chief source of interest in the poultry department centered around the egg-laying contest. This first contest, with 260 birds, contains many pullets well on the way to making good records. Not only are there many good individuals but the average at the end of the fifth month is far above that held by any other Canadian contest. The breeding and selection work with poultry is giving good results. This year there are thirty-nine 200-egg Barred Rock hens. Twelve of these laid over 230 eggs, the best individual record being 282 eggs. The White Leghorns did not do quite so well, but of the twenty-three 200 egg-hens, ten laid over 230 eggs, the best hen giving a record of 262 eggs.

For the first time an attempt was made to grow sunflowers under field conditions for ensilage purposes. The sunflowers yielded at the rate of 14 tons 300 pounds per acre as compared to 15 tons 1,807 pounds per acre of corn. Work in the cereal section consisted of testing 2 varieties of wheat, 11 of oats, 12 of barley, 2 of mixed grains, 6 of peas and 4 of beans. In forage crop work, 40 varieties of mangels, 13 of carrots, 3 of sugar beets and 13 of ensilage corn were tested.

In the orchard the apples and pears showed a marked improvement over previous years, the crop being the best as to quality and quantity so far. Plums and cherries bore well, but the plums and late cherries were almost completely ruined by the heavy rains. The small fruits yielded large crops. Roses, perennials and annuals were very good, flowering shrubs and trees were excellent. The tulips and other spring bulbs made a particularly good showing.

No fencing except that of a temporary nature was done. No land clearing was attempted other than what was accomplished in connection with getting out fuel. A new modern poultry house, 140 feet long, was erected to house the contest birds. That

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portion of the main barn formerly known as the horse stable was remodelled and equipped with modern steel fittings. It now makes a convenient addition to the calf pens and loose cow stalls. A litter carrier was also installed in the cow barn. A complete electric lighting system was installed which lights all the farm buildings. The power is secured from a plant in town.

EXPERIMENTAL STATION FOR VANCOUVER ISLAND

THE SEASON

The climatic conditions experienced during the year gave crop yields that compared favourably with any year in the experience of this station. The spring season opened very early, followed by cool, backward weather in late April and May. More rainfall was experienced than usual during the growing period April to October. Rains in September interfered greatly with late harvesting and threshing operations. Continued wet weather made soil conditions such that autumn seeding could not be undertaken in a general way, but was confined to high, sandy areas. The winter period was characterized by continued wet weather, lack of sunshine and absence of low temperatures. Conditions for outdoor work were not very favourable and costs per unit of work done were relatively high.

LIVE STOCK

No experimental work with horses has yet been commenced at this station, the horses on hand being used simply for farm labour.

A small herd of Jerseys is being gradually built up. This herd is now on the accredited system. A flock of six registered Southdowns were imported from Ontario as a foundation for a new flock. With swine the Berkshire is the breed kept. These are housed in colony houses, which are used in conjunction with portable fences or hurdles and have proved very desirable swine rearing equipment for island conditions, inasmuch as the capital cost is very low and a high degree of efficiency is obtained.

Extensive work in poultry keeping was carried on during the year, covering experiments in breeding, collection of cost of production data, data of maintenance, incubation, brooding and rearing. Electric brooders were found to be very satisfactory for use during the first few days of the chicks' lives. A considerable number of birds were transferred to other experimental stations and a large number of breeding birds sold within the province. The poultry plant was enlarged by the addition of two permanent laying houses.

The work with bees was very successful, a surplus of 50 pounds of honey per colony being obtained. Wintering experiments were carried on and considerable data gathered as to the source of nectar at various seasons, effect of temperature changes, availability of nectar, swarm prevention, etc.

In field husbandry one object of the work being carried on is to find a rotation satisfactory under conditions prevailing at the station, namely, wet winters, dry summers, high prices, stony land and high cost of getting work done. The results so far indicate the advisability of using grass and hay crops more extensively. Rotations with two years' hay or pasture, in either a three or four years' cycle, are most profitable.

With cereals, tests of varieties was carried on and also comparison as to the relative yields of autumn and spring-sown grain crops. Variety tests were also conducted with Indian corn, roots, alfalfa, grasses and sugar beets.

In the orchards, cultural and variety tests were conducted with tree fruits. The nut plantation was extended and work carried on in the study of foreign economic plants. Tests of varieties of small fruits were made. Special attention was given to the production of vegetable seed and to the tests of suitable varieties of vegetables.

During the year an office building was erected; also a laying house and a workshed.

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Repairs were made to some of the other buildings. Improvements were made to the fields by the removing of rocks and roots and graveling and grading were done on the farm roads.

An exhibit was shown at a number of points in British Columbia and the superintendent attended a number of meetings where he gave addresses and acted as judge at numerous rural fairs.

DAIRY AND COLD STORAGE BRANCH

THE PROGRESS OF DAIRYING

Good progress was made in the dairying industry during the year under review, notwithstanding the uncertainty as to the probable tendency of prices and the irritation produced by the continuance of Government control of the butter trade in the United Kingdom.

The only branch of the industry which was seriously affected by post-war conditions was that dealing with condensed milk and milk powder. Late in the season of 1920 the condensed milk market became so demoralized and the holdings of the manufactured article increased to such an extent that in both the United States and Canada many of the condensaries were closed, and others operated with greatly reduced outputs. The milk powder factories in Ontario were closed for some time, and have not yet resumed full operation. A considerable quantity of milk and cream was, in consequence, diverted to cheese factories and creameries.

Full returns of the production of cheese and creamery butter are not yet complete, but it is expected that the total quantity of creamery butter for the season of 1920 will exceed that of the previous year by several million pounds. The total production of creamery butter in 1919 was 103,890,707 pounds. The production of creamery butter is increasing in all the provinces. The production of cheese, which increased during the first two years of the war, has since shown some decrease. The expansion of the condensed milk industry was almost wholly the result of the diversion of milk from the cheese factories. The increasing demands of the towns and cities for milk, cream, and ice-cream make further annual inroads on the cheese industry. Cheese making has been carried on only in those districts where a large quantity of milk is produced, and it is to these districts that the city milk distributors naturally turn for supplies.

The figures of the total dairy production for the season of 1920 are not yet available. To indicate the extent of the industry and the proportion of the milk which is used for different purposes the figures for 1919 are given.

TOTAL PRODUCTION, QUANTITIES, AND PERCENTAGES OF MILK USED IN CANADA DURING 1919 FOR DIFFERENT PRODUCTS.

Product.	Quantities.	Values.	Milk Used.	Per Cent.
		\$	lb.	
Cheese.....Lb.	167,734,982	44,805,794	1,845,084,802	18.18
Creamery butter....."	101,554,131	55,182,422	2,416,988,317	23.81
Dairy butter....."	125,000,000	56,250,000	2,975,000,000	29.31
Whey butter....."	1,396,814	661,373	.....	.....
Condensed and evaporated milk....."	78,006,237	11,214,165	195,015,592	1.92
Milk powder....."	6,591,099	1,539,272	.....	.....
Sterilized milk....."	7,460,400	852,080	7,460,400	0.07
Condensed skim-milk....."	494,973	32,921	.....	.....
Casein....."	199,013	32,588	.....	.....
Ice-cream.....Gals.	2,892,974	3,715,488	57,859,455	0.57
Cream.....Lb. B. Fat	6,380,727	4,718,678	182,306,485	1.79
Whey cream.....	.....	521,420	.....	.....
Milk, used as such.....	72,000,000	2,472,000,000	24.35
Total.....	251,526,301	10,151,715,051	100.00

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The calculations for the quantities of milk in the above table are based on 11 pounds of milk for 1 pound of cheese; and 3.5 per cent of fat in the milk with a 20 per cent overrun for butter; and 7 pounds of ice-cream per gallon with 10 per cent of fat and 18 per cent of fat in the cream.

In the above table it will be observed that under the heading "Milk used" no quantities are given opposite "whey butter," "milk powder," "condensed skim milk," "casein," or "whey cream," for the reason that these are all by-products.

THE MARKET SITUATION

The market situation at the present moment is very uncertain. Butter was decontrolled in the United Kingdom on March 31, but the ministry have on hand or to arrive to complete contracts, a large quantity of butter which will now be sold on the open market. Large quantities of cheese have come forward from New Zealand owing to the accumulation on hand from previous years. Supplies from Denmark and Holland, although not yet back to the pre-war level, are increasing. The difficulties of exchange complicate the situation. The only thing that seems at all certain is that the prices of dairy produce will remain relatively higher than most other lines of farm produce. The market can hardly be expected to reach a state of equilibrium until the rates of exchange become more normal. Large quantities of Danish butter have been shipped to the United States, where it is not needed and where it has helped to increase the surplus. In the sale of this butter to the United States an anomalous position exists, as the Danes have been able to secure a better return than they could by shipping to England, where the price is higher than it is in the United States. This all arises out of the exchange situation.

There appears to have been a considerable increase in the consumption of butter in Canada during the last six months. At the time of writing the price of butter is higher in Canada than it is for the same grade in the United States.

DAIRY ORGANIZATION

The conditions arising out of the war have stimulated dairy organization. The most notable move in this direction is the widespread organization among producers. The activities of the National Dairy Council, which was organized in November, 1918, at the suggestion of the department, have been effective in securing reasonable consideration for the legitimate claims of the industry. If the council continues to follow the sound lines of policy already adopted this organization is bound to exert a wholesome influence in the business of dairying throughout Canada. Strong provincial associations of dairymen are now organized in all the provinces. The functions of these associations vary somewhat according to circumstances, but if they do nothing more than bring the various interests together in annual conventions, to give expression in united voice on the various questions and problems that arise, a very useful work will be accomplished. All the provinces have well organized dairy branches in the several Departments of Agriculture.

STATISTICS OF DAIRYING

The Dominion Bureau of Statistics published a report on dairy factories for the year 1919, following the plan adopted in 1917. These reports contain much useful information regarding the operation of cheese factories, creameries, condensed milk plants, etc.

FINCH DAIRY STATION

The business of the Finch Dairy Station continues to grow. In 1920 the total quantity of milk received was 5,570,545 pounds as against 2,069,281 pounds in 1912 which was the first year of operation. During the year 1920 both butter and cheese

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were manufactured, and a large quantity of both milk and cream was sold to milk distributors and condensaries. The average net return to the patrons was \$2.49 per hundred pounds, after deducting the prevailing rates for the manufacture of butter and cheese and the handling of milk and cream.

The operation of the Finch Dairy Station has demonstrated the advantage of a factory having more than one outlet for the milk received. By being in a position to sell milk or cream on demand, or to manufacture butter or cheese, as the case may be, full advantage is taken of the highest market which is offered at the time. The operation of the station along these lines has attracted considerable attention, especially since the patrons of the condensaries in western Ontario found themselves in an awkward position when some of these factories reduced their output in the fall of the year 1919.

Finch Dairy Station shows a profit on the year's operations.

THE LACK OF CAPABLE MANAGERS

The dairy industry is suffering from the lack of capable managers for cheese factories and creameries. The seasonal nature of the employment in many of the factories and the comparatively low scale of salaries has tended to discourage competent men from taking up this line of work.

There never was a time in the history of the industry when there were better or more numerous openings for thoroughly qualified men than there is at the present time.

COW TESTING

The interest in cow testing continues to grow and a large number of requests for assistance are being received this spring than ever before. The active co-operation of the Departments of Agriculture in Quebec and Ontario have had a stimulating effect. At the conference of deputy ministers held in Ottawa on March 17 to 19, 1920, it was agreed that whenever any of the provinces were prepared to take over the cow testing work this department would be ready to make the transfer. The provinces of Saskatchewan and Manitoba have already accepted the responsibility. It is believed that the provincial organizations with their numerous field agents are in a better position to carry on this work than the Dominion Department is without the employment of a very large staff. In the interest of general economy it seems desirable for the work to be transferred whenever practicable to the provincial authorities.

DOMINION EDUCATIONAL BUTTER SCORING CONTEST

The Dominion Educational Butter Scoring Contest inaugurated in 1919 was continued in 1920. It is acknowledged that this service has promoted uniformity in the methods and practices followed in the creameries in different parts of Canada. It has demonstrated that equally good butter can be made in all the provinces, and that there is now, as a matter of fact, a remarkable uniformity in the character and quality of the butter being manufactured in the different sections.

Samples of butter selected from the contest have been taken to the different provincial conventions and discussed fully with the buttermakers in attendance.

The educational value of this contest appears to be so important that it has been decided to continue it, with modifications, for another year.

GRADING OF DAIRY PRODUCE

A new line of work was undertaken by the Dairy Branch in 1920 in the grading of cheese for sale by auction at Montreal. The whole question of grading, both for domestic and export purposes, has been widely discussed during the year and there

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is now a general demand for the grading of all dairy produce intended for export, a demand which the department is prepared to meet. At a conference of Deputy Ministers of Agriculture held during the year it was agreed that the grading of dairy produce for domestic use might be left to the provinces, while grading for export was conceded to be a Dominion function.

CARGO INSPECTION

With the resumption of regular shipping on the opening of the St. Lawrence season of 1920 the cargo inspection service was again placed on a pre-war footing. Labour conditions at the ports, and to some extent the lack of suitable steamers for perishable products, called for careful oversight in order to secure the handling of this class of cargo in the best possible manner.

The placing of thermographs in all chambers carrying refrigerated products was continued. Reports from the Cargo Inspectors in the United Kingdom regarding goods being landed in damaged condition were passed on promptly to the shippers. Market information of value to Canadian producers was transmitted through the same channel.

REFRIGERATOR CAR SERVICES FOR BUTTER AND CHEESE

The usual special refrigerator car service for the carriage of butter in less than carload lots was in operation, by arrangement with the railway companies, from May to October. The iced-cheese-car service, by which shippers are enabled to secure iced cars for the shipment of cheese in car lots, was also in operation during the hot weather.

MARKET INTELLIGENCE

The Extension of Markets Division of this branch issued a Dairy Produce Market Report throughout the Dairy manufacturing season. A weekly letter is despatched every Monday, giving the latest information from the Montreal and Toronto markets up to noon of that day. Paid lettergrams are sent on Monday and Friday evenings to certain specified officials in the different districts, who are then in a position to give the information by telephone, or otherwise, to salesmen in their immediate vicinity. Similar collect lettergrams are sent to any person who requests to have his name put on the list.

A DAIRY NEWS LETTER

The Monthly Dairy News Letter published by this branch, the first issue of which was dated October 4, 1919, appears to be popular judging by the requests received from all over the dairy world for names to be put on the mailing list. This letter is intended to give items of information relating to the international situation, as well as to the industry in Canada, which would not otherwise receive publicity.

ADMINISTERING OF THE DAIRY AND OLEOMARGARINE LAWS

The Dairy Branch is charged with the administration of the Dairy Industry Act, 1914, and regulations thereunder; and the Oleomargarine Act, 1919, as amended, and regulations. A staff of nine inspectors under one senior inspector is employed, who cover the whole country by districts. Some of these inspectors give only part time, being employed at seasonal work in other lines. The Department has the co-operation of the Royal Canadian Mounted Police in administering these laws.

GRIMSBY COLD STORAGE

The Grimsby Cold Storage was again operated on commercial lines. The refrigerated space is used by fruit growers and shippers (a) for the precooling of

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tender fruits intended for distant markets; (b) for short term storage over week-ends, or while car lots are being accumulated; (c) for carrying fruit over periods of glutted markets; (d) for the storage of fruit intended for canning but which are coming in faster than the canneries are able to handle them. The space is also used for the winter storage of apples.

The advantage of having cooling and storage facilities in a fruit district which depends largely on distant markets has now been fully demonstrated. Much fruit is saved from deterioration or even total loss; by making more distant shipments possible the market is enlarged; prices are stabilized and production is encouraged, thus benefiting both the fruit grower and the consumer. It is expected that after the season of 1921 the Grimsby Cold Storage will be purchased by a new organization of fruit growers in the district.

THE COLD STORAGE ACT

There were no contracts entered into during the year for the payment of subsidies under the Cold Storage Act. A contract was offered to a firm at North Sidney, but up to the present it has not been signed by the applicants. This is a revival of an old contract entered into before the war, in connection with which the erection of the warehouse was delayed on account of war conditions.

CREAMERY COLD STORAGE BONUS

There were seventeen applications received for creamery cold storage bonuses during the year. Of this number fifteen received the full bonus of \$100, one was refused, and one deferred for further action.

SMALL COLD STORAGES

The Dairy Branch continues to receive many inquiries for plans and specifications for small refrigerators, suitable for the use of farmers, country stores, summer homes, and other places where ice is stored for domestic purposes.

NEW PUBLIC COLD STORAGE WAREHOUSE AT MONTREAL

Good progress has been made by the Harbour Commissioners of Montreal in the erection of a public cold storage warehouse on the harbour front. This warehouse when completed will be one of the best equipped on the continent, and should be of great advantage to the export trade in perishable products.

PUBLICATIONS

The following publications in the Dairy and Cold Storage Series were issued during the year:—

Bulletins: 55. "The Finch Dairy Station, Report of Progress."

56. "Report of the Dominion Educational Butter Scoring Contest, 1919."

57. "Simple methods for the Storage of Ice."

58. "The Progress of Cow Testing."

Circulars: 27. "Yield and Relative Value of Some Dairy Products."

28. "Dairy Industry Act, 1914, and Regulations."

29. "The Oleomargarine Act, 1919, as Amended, and Regulations."

30. "Notes on the Cold Storage of Eggs."

HEALTH OF ANIMALS BRANCH

The officers of this branch, under the direction of the Veterinary Director General, have been engaged in controlling and eradicating contagious diseases of animals and in the inspection and testing of import and export stock, in accordance with the provisions of the regulations passed under the Animal Contagious Diseases Act, as well as the inspection of export and import meats, meat food products, canned fruits and vegetables, under the Meat and Canned Foods Act. The statistics given in the annual report of the Veterinary Director General for the year ending March 31, 1921, indicate that the work of this branch is of a very important nature, and that it has been carried out very satisfactorily.

Unfortunately this branch has been working under difficulty, owing to the scarcity of suitably trained veterinarians. The field of veterinary science in recent years has broadened out very materially, so much so that educational authorities have within the past year raised the standard of veterinary education. It is now necessary for the young man to take his junior matriculation before he can enter any accredited veterinary college on this continent. He has then to attend a four-years' course, the college year extending over eight months. While it is realized that this change is very necessary, it is feared that it will for some years at least seriously reduce the number of men entering the profession. The remuneration of the veterinarian has not been at all commensurate with the value of the services rendered by him. The well trained modern veterinarian is of inestimable value to our live stock interests, and when it is considered that many of these men have not the essential qualifications of character, such as tact, diplomacy, good judgment, and firmness for our work, the difficulty of maintaining an adequate, efficient force for the protection of our live stock interests and foreign markets is very apparent. If Canada is to maintain its record of freedom from disease, the Health of Animals Branch must be maintained at the highest possible degree of efficiency. It may, therefore, be necessary in the near future to take suitable measures to encourage men of the proper type to enter our veterinary colleges, as the continued scarcity of properly trained veterinarians will interfere very seriously with our efforts to maintain our herds and flocks free from serious diseases. Although with its present staff this branch has been able to control diseases of live stock, there is a great deal of valuable work it was unable to undertake, owing to the limited number of properly trained veterinarians on its staff.

GLANDERS

A few small outbreaks of this disease have been dealt with in Manitoba, Alberta, Ontario, and Quebec, necessitating the slaughter of fifty-nine (59) animals. The majority of these cases were found in the outlying districts in the province of Alberta and the outbreaks were promptly eradicated. It is interesting to note that no cases were found in the province of Saskatchewan and only two in Manitoba. These two provinces were badly infected some years ago, necessitating the slaughter of many thousands of horses. The strict enforcement of our policy of slaughtering all animals reacting to mallein has had the desired effect and indicates most clearly that it is a sound and wise policy. It has been possible under this policy to practically exterminate this dangerous disease in Canada. Owing, however, to the fact that immigrants and others are constantly bringing in horses, and although the greatest care may be taken to detect infected animals at the boundary, there is always the possibility of incubative cases passing the most rigid test and eventually developing the disease at destination. We may, therefore, expect to find cases from time to time, but so long as there is a wide-awake, efficient veterinary force serious outbreaks are not likely to occur.

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DOURINE

In my last report attention was drawn to the fact that only two horses were destroyed for this disease during the period covered by that report. It was also pointed out that these cases did not show any evidence of this malady, but as they did not give a satisfactory negative reaction to the laboratory blood test, it was considered wise to destroy them.

The closest attention has been given by officers in the areas in which this disease existed to such an alarming extent many years ago. Many animals have been inspected and laboratory blood tests made, and all tests gave satisfactory negative results. This disease has, therefore, after many years of persistent work been eradicated from this country.

HOG CHOLERA

This disease has been dealt with in each province except New Brunswick and Nova Scotia and the Yukon Territory. It has been more troublesome in Ontario than in the rest of Canada, as more than half of the total number of hogs slaughtered for this disease were in that province. No extensive outbreaks have however, occurred, and while it has been necessary to slaughter approximately twenty-three hundred (2,300) more hogs during this period than in the previous year, the compensation has been the same. The lower cost has been largely due to the policy followed in withholding compensation in cases where outbreaks have occurred in garbage-fed hogs.

As has already been explained in previous reports, the department found it necessary some years ago to control garbage feeders, owing to the fact that the majority of our outbreaks occurred in garbage fed hogs. An order was, therefore, passed prohibiting the feeding of this material unless the license for so doing was obtained from the Veterinary Director General. Owners are definitely warned before a license is given them that they must strictly observe certain definite conditions, one of them being that the garbage must be thoroughly cooked before being fed.

Our officers have endeavoured to visit premises on which garbage is fed as frequently as possible, but the owners have many opportunities to be negligent in cooking the garbage, with the result that sooner or later an outbreak occurs. If the owner is unable to prove conclusively that the infection was brought on to his premises by some other means than the garbage, no compensation is paid.

The department has been very strict with regard to enforcing this requirement, as any negligence in the cooking of garbage results in an increased expenditure for hogs slaughtered for hog cholera, which could have been avoided if the garbage feeder had paid proper attention to cooking. It is not, therefore, considered wise to relax the regulations in this connection.

The outbreaks which have occurred during the past fiscal year have all originated on premises where garbage has been fed. Some of these outbreaks have been traced to other outbreaks in the district, and in such cases the owners have been given the benefit of the doubt and compensation paid.

Garbage feeding has for the past few years been the chief cause of our hog cholera outbreaks and it is therefore, necessary to supervise these feeders just as carefully as possible. There are, however, so many of them distributed throughout this country that, in order to give this work the attention it requires, it will be necessary to employ a very large number of men for this purpose. In the meantime the staff of inspectors for this work is being gradually increased and the results watched carefully.

MANGE IN HORSES AND CATTLE

Horse mange has not at any time been prevalent in this country. A few cases have been dealt with in the provinces of Saskatchewan, Alberta and British Columbia

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during the period covered by this report, and a much larger outbreak occurred in Manitoba, which has, however, been kept under control and will soon be eradicated. A thorough investigation of the source of infection of this outbreak indicated that the disease was introduced by Indian ponies. The common Indian custom of visiting reserves on either side of the international boundary and the likelihood of their crossing the boundary at points other than authorized ports, is a source of danger. This practice has on more than one occasion resulted in outbreaks of contagious disease. The matter has, however, been brought to the attention of the proper authorities who will take measures to keep in closer touch with the movements of the Indians.

Cattle mange has always given the department considerable concern, especially in Alberta and Saskatchewan. In the last annual report it was mentioned that a conference had been held between officials of this department and the live stock owners at Calgary, and that as a result of this conference it had been decided to enforce a compulsory dipping order in the period between June 24 to July 5. An educational campaign had been conducted during the winter months by our officers and the stock men realized the importance of giving the department their full support in its endeavour to eradicate this disease.

The regulations which had been in force for very many years over a large area caused a great deal of inconvenience and annoyance to shippers of live stock and they were, therefore, prepared to assist the department if there was any prospect of the removal of the blanket quarantine. Having obtained their assurance of co-operation it was felt that the department was justified in assisting in every possible way. It was, therefore, arranged to give a grant of \$400 towards the erection of vats when built in accordance with our approved plans, in districts where vats were not available, and over one hundred vats were erected under these conditions.

The area covered by the dipping order was carefully divided into districts and committees of stockmen chosen to look after the districts to see that sufficient vats were available and that they were in good working order. Each committee man had allotted to him certain specified duties for which he was held responsible. Every possible means was taken to overcome any difficulties and to have the work organized as completely as possible.

Dipping commenced promptly on June 24. The first dipping was completed on July 4 and the second about the 15th of that month, there having been approximately 200,000 cattle treated twice.

It was very fortunate that the weather conditions were most favourable for effective work, and that with very few exceptions the live stock men assisted in every possible way to make the dipping a success. It was, it is believed, the first time on record that the department was able to obtain the united co-operation of practically all the live stock owners in the area.

As soon as full detailed reports had been received from my officers with regard to the dipping, the question of removing the restrictions which had been in existence for so long was very carefully considered. The conclusion was reached that it would be reasonably safe to have them removed and an Order in Council was passed on August 12 for this purpose.

In releasing these restrictions it was fully realized that a territory of such large proportions and varying conditions, which had been so long infected, could not be entirely freed from mange by the enforcement of a compulsory dipping order, however thoroughly the treatment may have been carried out. However, in view of the full co-operation of the live stock men and the special efforts made by my department to dip every animal twice, it was felt that it was reasonably safe to remove the quarantine, provided a very close supervision was maintained over this area for some time. The inspectors have, therefore, systematically inspected the cattle in this area and have quarantined herds in which any suspicion of the disease existed. These herds are

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being dealt with individually and this action has in a very large measure removed inconvenience and annoyance to a large number of stockmen, who under former conditions were obliged to comply with the regulations even though their herds were clean.

The closest investigation carried on during the winter months has justified the action taken in this connection.

The disease has since been detected in a number of herds but the outbreaks have been sufficiently limited to enable the inspectors to deal with them effectively by the enforcement of individual quarantines and treatment.

In view of the great importance of protecting our export trade it was considered essential to have all export shipments from this area carefully inspected by a veterinary officer before the necessary export district health certificate is issued. If the stock men will continue to co-operate with the department in reporting promptly any suspected cases of this disease, it is almost certain that we shall not experience any great difficulty in controlling this disease in the future.

BOVINE TUBERCULOSIS

The control of bovine tuberculosis presents perhaps greater difficulty than does that of any other malady affecting domestic animals. It is so widespread that any compulsory radical measures would undoubtedly result disastrously to our live stock trade. It is, therefore, essential to follow a careful progressive policy which will meet with the hearty support of our stockmen. Many of our breeders are now commencing to realize that the day is not far distant when they will be required to produce and place on the market not only animals of approved types but in addition thereto sound healthy individuals.

The inauguration of the accredited herd plan, which was referred to in the last annual report is meeting with general approval among breeders of pure bred cattle. There are so many herds undergoing accreditation that our officers are experiencing difficulty in giving them prompt attention. The Veterinary Director General is also receiving regularly applications from owners desiring to have their herds placed under the supervision of this department for accreditation. As herds must pass at least two annual tests without a reactor, and as this plan has not been in general operation for a sufficiently long period there are no fully accredited herds at the present time. There are, however, several herds which will receive their final test in the course of a few weeks and will then be accredited if all animals in these herds pass this test. The owners of these herds will then receive an accredited herd certificate which is good for one year from the date of issue. During that period they can ship out any animals for export without a special test.

This plan has been in operation in the United States for five or six years and there are a large number of fully accredited herds in that country. There is an understanding between this Government and that of the United States that cattle from these accredited herds can be shipped to either country without special test. This is a great convenience to the shipper and is now largely the cause for the interest taken by pure bred stock owners in the plan. This manner of dealing with tuberculosis will prove of inestimable value to the live stock industry, as the cleaning up of pure-bred herds and maintaining them free from tuberculosis will prevent to a considerable extent the dissemination of this disease. We are dealing with foundation stock, which supply our farmers with animals for the improvement of their herds. It is, therefore, gratifying that this plan is not only a practical one in the control of this disease but is quite popular.

In addition to this measure for the control of tuberculosis our officers have been busily engaged testing dairy herds in municipalities under the Municipal Tuber-

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culosis Order. Since the last report the number of municipalities taking advantage of this order has increased. The work takes up a great deal of time, as dairymen are constantly bringing in fresh cows and these must all be tested before they can be admitted into the herds.

Our experience has shown that the largest number of cases of tuberculosis is found during the first tests, and that afterwards the percentage drops very materially. Municipalities which have been under the supervision of this branch for the longest period are having the smallest number of reactors.

In addition to these two measures our officers are testing cattle sold for export, and also cattle in herds which were placed under the supervision of this branch some years ago.

In view of the great amount of work entailed in dealing with this disease and of the interest taken by the stockmen, it has been necessary to arrange for obtaining more trained assistance. An agreement was, therefore, arrived at between the Bureau of Animal Industry at Washington and this department to employ veterinary practitioners to make tests of export cattle, whose tuberculin test charts could be endorsed by the officers of my department. An examination was, therefore, held all over Canada on March 15, and as a result of this examination there, a number of veterinarians are now available who may be called upon to conduct these export tests. As these veterinarians are not officers of the Department of Agriculture, it will be necessary for the exporter to pay them for their services.

It is hoped that the exporters will take advantage of the services of these veterinarians as much as possible. It will give them quicker service and will also enable our officers to give more of their time to tuberculosis eradication work.

SHEEP SCAB

Only five small outbreaks of this disease have been dealt with during this period. Three of these were in Manitoba and two in Saskatchewan are being dealt with in the usual manner.

ANTHRAX

While there have been several outbreaks of this disease reported, a careful investigation by our officers, and laboratory tests, have not in any case confirmed the existence of this disease.

RABIES

A small outbreak of this disease occurred in the province of Ontario, but this outbreak was quickly controlled through the assistance of the municipalities enforcing muzzling orders.

INSPECTION OF STOCK CARS AND YARDS

Special inspectors are constantly engaged in the work of supervising the disinfection of stock cars and in the inspection of the various stock yards throughout the Dominion, for the purpose of ascertaining that these are maintained in a clean and sanitary condition.

QUARANTINE STATIONS AND INSPECTION PORTS

Quarantine stations and inspection ports have been maintained on the Atlantic and Pacific coasts and along the international boundary.

It is regretted that it has been necessary to refuse to issue permits for the importation of cattle, sheep, other ruminants and swine from any part of England, owing to outbreaks of foot and mouth disease in that country, but it is hoped that conditions may soon be favourable, in order that our breeders may have the opportunity of resuming their importations from that country.

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PATHOLOGICAL DIVISION

This department maintains the following laboratories and research stations:—

1. Biological Laboratory, Ottawa.
2. Research Station, Hull, Que.
3. Veterinary Research Laboratory, Lethbridge, Alta.
4. Veterinary Research Laboratory, Agassiz, B.C.
5. Fox Research Station, Charlottetown, P.E.I.

These laboratories and research stations are maintained for the purpose of carrying on specialized work required by the Contagious Diseases Division and the Meat and Canned Foods Division, and engaging in those problems of veterinary research which most intimately concern the live stock industries of Canada.

The work of this division falls mainly under the two headings,—laboratory routine and special research. It is conducted by officers who, in addition to their qualifications and experience as Veterinary Inspectors in the Contagious Diseases Division or the Meat and Canned Foods Division have received special training in laboratory technique and who devote themselves to the study and advance of veterinary science and to the practical application of the knowledge resulting from patient and laborious investigations and laboratory experiments.

This work, so essential for the efficiency of this department and for the welfare and protection of the livestock industries, increases and grows in importance from year to year correspondingly with the rapid growth and development of animal husbandry. The value of the work lies not only in the application of the most improved and modern methods of determining the presence and nature of various diseases and of their treatment and control, but also in the knowledge and means which, properly applied, prevent the occurrence of disease.

The public, that is to say stockowners, when calamity threatens or overtakes it in the form of an epizootic, is apt to clamour for miraculous interventions and to express disappointment when the animal pathologists fail to perform such miracles. When an outbreak of contagious or infectious disease actually occurs little can be done, as a rule, except to employ the most immediate and effective means of eradication which, in many cases, are necessarily drastic and entail further losses to individual owners. A great deal can be done, however, in the prevention of disease, and it is to prevention rather than to eradication that the efforts of this department are directed, and in which the work of the pathological division is of such great importance, but which passes more or less unrecognized by the public, who are rarely grateful for a calamity averted.

The routine work of these laboratories is of a highly technical nature and includes:—

(a) The manufacture of certain biological products such as tuberculin, mallein, blackleg and contagious abortion vaccines. These products are prepared, tested and standardized by the best known laboratory methods and every effort is made to perfect them as diagnostic agents or as preventive vaccines. An absolutely reliable tuberculin is of the utmost importance in connection with the diagnosis of tuberculosis and the efficiency of the Accredited Herd System. The output of this product alone has doubled again and again within the last few years, and at the present time by employing every means available within the limited facilities of the laboratory it is barely possible to meet the demand. With the further extension of the accredited herd work it will be impossible to meet the increase demand for tuberculin unless the laboratory accommodation and personnel is amplified.

The demand for blackleg vaccine has been so great that up to the present it has been difficult to meet. The preparation and disbursement of contagious abortion vac-

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cines is rapidly increasing. Though as yet sufficient data has not been collected to form a definite conclusion with regard to the efficiency of this method of preventing abortion, the reports received are encouraging. The commercial value of the output of biological products is considerably in excess of \$2,000 monthly.

(b) Routine examinations of specimens forwarded to the laboratories by veterinary inspectors, practitioners, farmers and stock owners, and inclusive of material obtained from abattoirs and packing establishments requiring a pathological or bacteriological report.

(c) Serum tests where a specific diagnosis is required for suspected dourine, contagious abortion and other diseases.

(b) Laboratory tests of samples of water, milk, meat and canned food products, disinfectants, etc.

(c) The preparation of exhibition specimens and collections for educational purposes.

(f) Letters of inquiry answered and advice given on questions relating to animal diseases and their prevention.

(g) The breeding, care and maintenance of experimental animals required in the routine work outlined above and for research work.

Research work has been carried on in connection with bovine tuberculosis, contagious abortion of cattle and haemorrhagic septicaemia. The latter disease frequently appears among horses, cattle, sheep and swine as sporadic outbreaks, and is often confused with or mistaken for blackleg, anthrax, forage poisoning or hog cholera.

At the Research Station, Hull, Que., the great problem of bovine tuberculosis is studied. The problem of animal parasites is also under enquiry and experiments are being carried out.

At the Research Laboratory, Lethbridge, Alta., the investigation of swamp fever of horses, which has been under way for many years, but subjected to frequent interruptions occasioned by the work involved in suppressing dourine, is making good progress.

Dourine has been entirely eradicated. A full report covering the history, research and suppression of this insidious disease (1904-20) has been made by the Chief Animal Pathologist, and published.

At the Research Laboratory, Agassiz, B.C., experiments are being conducted on contagious abortion of cattle. Certain sheep and goat diseases have been investigated. A report on Coccidiosis of British Columbia cattle has been published.

At the Fox Research Station, Charlottetown, P.E.I., diseases of foxes, particularly distemper and animal parasites, which account for most of the losses experienced, are under investigation. Methods of preventing these conditions are being devised and tried out. Several papers dealing with questions of hygiene and sanitation have been published, as well as an important contribution on anthelmintic treatment.

An investigation of nutritional diseases of foxes is carried on at the Research Station, Hull.

Poultry diseases are being studied by one of the pathologists, who is specializing in this line of work at the Central Experimental Farm, Ottawa.

MEAT AND CANNED FOODS DIVISION

MEAT INSPECTION

Not since the inauguration of this work, nor perhaps since the development of the packing-house industry, has there been as critical a period as during the past year.

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During the war, owing to the excessive demand for all the meat and meat food products that could possibly be exported from Canada, packers were enabled to carry on business with a decided degree of security. Following the cessation of hostilities, however, the demand for these exportable products decreased to a marked degree.

Producers, on the other hand, still held out for the high prices of live animals. Markets were falling rapidly and labour and overhead charges were at the highest peak known in the history of the business, which conduced to the creating of a very high-priced finished product.

Our export market for frozen beef was almost immediately lost. The control of bacon in Great Britain rendered that phase of the business very uncertain, in consequence of which the packers have undoubtedly suffered a tremendous loss. This, together with the careful purchasing by residents of Canada, had the effect of so seriously interfering with this particular trade, that it has necessitated the closing of some of the larger packing houses in Canada.

The staff required to man these houses has been more than taken care of, by utilizing their services in the Diseases Division, in connection with the increase of the work made necessary by the tuberculosis eradication policy.

The slaughter of the different meat food animals for the year were as follows:—

Cattle—826,000, a decrease of 139,000 from the previous year.

Sheep—166,000, an increase of 65,000.

Swine—1,682,000, a decrease of 489,000.

The post-mortem report shows little change other than an increase in the number of animals affected with tuberculosis. It is felt, however, that beneficial results will accrue from the work of eradication at present being carried on through accredited herds, and other measures recently adopted.

In the past, the laws governing imports were such that meat and meat food products could enter Canada without any interference, and compete with the Canadian inspected product. This, it was felt, worked a grave injustice to our Canadian packers and the public, especially in view of the fact that Canadian animals slaughtered in establishments under inspection were subject to severe and searching post-mortem examination, and the products handled, during the process of manufacture, under strict sanitary regulations before being marked with the Inspection Legend.

This condition, however, was overcome by bringing into operation, during the past year, new regulations governing the control of imports.

Without dealing at length with the value of inspection to the Canadian consumer and our export trade, the latter, by the way, could not continue if it were not for our system of inspection, as our meat foods are forbidden entry into foreign markets unless marked with the Canadian Inspection Legend and covered by an official certificate, signed by one of the duly accredited officers of this division, it may be said that the reputation made for Canadian meats and meat food products during the war, as evidenced by the commendatory resolution of the Allied Purchasing Commission, was due in a great measure to the rigid technical examination for diseases and the rigid control of sanitary measures in establishments operating under the provision of the Act.

To preserve the good name of Canadian meats and to continue to hold our place in the markets of the world, our present reputation must be upheld, which can easily be done, if the producers in Canada will do their part in furnishing properly matured and finished live animals, together with the control now exercised as to inspection and sanitation.

During the year an amendment to the Oleomargarine Act was put through, and new regulations governing its manufacture and importation were passed.

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The principal effect of the new Act was to extend the time in which this product might be manufactured and imported into Canada.

A great deal of information has been obtained regarding this food and it would appear that if it is to be continued, some steps should be taken along the lines of standardization in order that the quality may be safeguarded, and the consumer protected.

FRUIT, VEGETABLES, AND MILK

During the past year, new regulations governing the manufacture, import and export of these products were brought into operation.

The principal change in the regulations dealt with the certification of imports, which entailed an immense amount of work, but the results derived fully warranted an expenditure in connection therewith.

The wisdom of this department in insisting that the quality of the product be stated upon the label is quite apparent. Consumers are, at all times, willing to pay fair prices for any article of food provided they can be shown that reasonable value is obtained for their money.

The custom in the past, of simply labelling food products without declaration of the quality, provided means whereby an unscrupulous packer could mark an inferior product with a flashy label, the consumer having no means of knowing, prior to purchase, what he was buying.

These conditions have done more than anything else in creating in the minds of the public a lack of confidence with regard to canned foods, which was indeed most unfortunate, as canned foods of good quality put up under sanitary conditions in convenient packages, and at a minimum cost, are essential to the development of our country.

Climatic conditions in Canada are such that a continuous supply of fresh fruit is impossible unless imported at exorbitant prices, thus depriving the average consumer of a very necessary food.

The housewife in the past met this condition to some extent by home-canning. However, the present shortage of domestic help coupled with the general tendency to avoid this irksome and somewhat troublesome method, has been conducive to increasing the demand for factory canned products. There is no doubt an economic advantage is also to be gained which should be productive to improving the quality of the articles canned.

Most modern factories contract for their supplies the previous winter and in many instances furnish the seed of known and specific value, and to a certain degree exercise supervision over the methods employed in the cultivation, and instruct as to the time of delivery, etc., in order that the raw materials may be packed and processed as expeditiously as possible, the work at the canning plants being under the supervision of my officers, who are most exacting as to sanitary conditions. It is therefore possible for such plants to place on the market a superior product at a minimum cost.

If due care is exercised in the grading of the raw material, no difficulty will be experienced in producing a superior finished product, true to the quality named on the label, the difference in quality being one of appearance of grade, rather than that of actual food value. Certain factors govern this, namely, the degree of maturity, form, shape, evenness of size, and proper preparation.

The value and importance of quality packing will commend itself to producer, packer and consumer alike and will prevent what has hitherto been the greatest obstacle in the canned foods industry, namely, the lack of confidence in the uniformity of the product.

Special vigilance has been exercised by my officers in connection with imports. Some slight inconvenience was caused at the commencement, yet those who were anxious to comply with the law soon adjusted their business to the new requirements.

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The policy of tolerance was carried out rather than one of intolerance. Improperly labelled products were either detained until satisfactorily marked or were returned to the country of origin. This course rather than that of legal action was pursued. Vast quantities were condemned as unfit for food, and several shipments were refused entry into the country.

Owing to it being an easy matter to create a false impression in the public mind, particularly where foods are concerned, my responsible officers deemed it advisable not to advertise these facts, believing at all times that a quiet, efficient, systematic control could accomplish the desired aim, better than the doubtful policy of litigation, which in most cases is accompanied by press notices of an alarming rather than of an assuring character.

The past season being ideal for the production of fruit and vegetables, large quantities were handled by the various canning establishments, prices being the highest in years. The falling off of export buying however, left the packers with immense quantities of finished products on their hands.

It is not to be presumed that business conditions generally have not had a great deal of effect on this industry. Unemployment and decrease in earning power of a great many workers have been important factors in slowing up the sale of all commodities. There are signs, however, more hopeful for the future, namely, the revival of export buying.

CONDENSED AND EVAPORATED MILK

The temporary closing of the export demand for this class of food threatened to interfere very seriously with its manufacture in Canada. At the moment however, it would appear that conditions are rapidly improving. Several large shipments are now going forward into export trade. This together with the increased home consumption during the summer months will in all probability furnish sufficient outlet for the present, and in the meantime it is hoped that trade conditions will become normal and thus preserve to Canada one of her very important industries.

The quality of the products manufactured in Canada, meet the most exacting requirements, as sanitary conditions in the establishments are of a very high order, and in keeping with the most modern ideas.

LIVE STOCK BRANCH

HORSE DIVISION

Recently the statement that horse breeding was on the decrease has been given considerable publicity. Among the reasons given for this decrease are: a falling-off in the demand for horses; that trucks are rapidly replacing horses in the cities; that tractors are being substituted for horse-power on the farms; and that in short, it will only be a matter of a very few years before the horse will have actually passed. During wartime the cost of feed was also used as an argument against the horse. Nevertheless, a careful analysis of the situation goes to show conclusively that horses have steadily increased in numbers during the war years. However, had the report stated that there had been a decrease in certain classes of horse it would have been correct.

During those years farm products brought high prices, while the work of distribution also brought great returns. The cost of production and of distribution was not given serious consideration. In city and country alike it would appear that the people interested, acquired a wrong conception of the value of horse-power and its place as an economic factor not only on the farms but also in the cities of this country. A change, however, has now taken place. Money is no longer passing as freely as heretofore. The cost of horse feed is very much lower than it was even a year ago. In

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fact the cost has practically been cut in two. Farm products have fallen in many cases more than 100 per cent, while the price of other commodities must necessarily follow the downward trend. Under these changed conditions it is necessary to take stock of our assets; to seriously consider the cost, not only of producing but also of distributing the products of our country.

The question of power has been discussed with farmers, dealers, owners and managers of cartage companies, delivery companies and various firms interested in transportation in one form or another. Many of these men were using both tractors and horses or trucks and horses as the case might be. The consensus of opinion backed up by cost accounting is that horse-power taken by and large is the cheapest power for farm work while in the cities for delivery and cartage work within a radius of from five to seven miles or on a loop route or even on a long route with frequent stops horses supplied the cheapest means of transportation.

The question that seems to trouble dealers and managers of large distributing companies is supply. Some companies use hundreds of horses and they are finding increasing difficulty in securing suitable animals to keep up the supply. Old, experienced dealers claim that it is becoming increasingly hard to secure horses of the required types and weights. The owners, managers and dealers point out clearly and forcibly that something must be done immediately to correct the erroneous ideas and reports that have gone abroad throughout the country. These men further state that the day of the horse is not passed and never will be in this northern country. They claim that a horse breeding propaganda should be started to encourage farmers and breeders to breed horses of the required type, otherwise there will be a shortage inside of the next three or four years.

Two classes of horses are particularly wanted in the cities. At the present time there is a scarcity of clean, sound draughters weighing from 1,600 pounds upwards. The farmer who will breed and feed this class of horse is assured of a market at a very remunerative price. The great difficulty to-day is the scarcity of such horses. The other class for which there is a steady and growing demand, is wanted for delivery work. This work calls for a horse possessing good conformation and action, clean legs, good feet and pasterns and weighing from 1,100 to 1,400 pounds. They are required to trot at a fair gait but not go high. Horses of this type bring as much as drafters weighing upwards of 1,600 pounds. Cities are finding more or less difficulty in securing suitable fire horses. One city recently required 160 head. The first advertisement for 50 of this number at \$300 each failed to bring in any tenders.

Horses suitable for military and police work are also becoming hard to secure, while choice saddlers and hunters are only to be found occasionally even in districts that formerly were noted for breeding this type. The scarcity of this class has recently become so acute as to cause those directly interested to draw the attention of this department to the existing conditions and to ask that the matter be given immediate attention.

A careful study of the situation brings out clearly that the present is an opportune time for taking up the breeding of certain types of horses. It should be remembered, however, that there is no place and no market for the scrub and non-descript. Indiscriminate breeding methods should not be employed if success is desired. To be successful the breeder must breed a definite type of horse for which there is a market. In order to produce that type a suitable sire must be used and the dam must also be of the required type, possess sufficient size, good conformation and action and be sound, while the colt must be well fed and cared for. Breeding without care and feeding cannot be a success. Undoubtedly, the lack of feed is accountable for many of the thousands of under-sized horses in Canada to-day.

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PURE-BREDS

In connection with breeding there is another point that should be given attention. Canada has been importing pure-breds for breeding purposes for many years. In 1920 in the neighbourhood of one thousand (1,000) horses were brought in, which brings the number imported between 1914 and 1920 inclusive to over six thousand (6,000). This means that millions of dollars went out of the country for horses, the majority of which could have been bred at home. The importing of a few outstanding horses yearly is beneficial. The bringing of hundreds of very common animals is not only detrimental but positively harmful to the country. What is really needed is more breeders who will mate their best to the best and feed and care for the progeny. It is high time that Canada was breeding her own pure-breds with the exception of a few outstanding sires and dams. The horsemen of Canada can raise horses away above the average of those imported and at a saving of millions of dollars if they will only take up the work seriously.

CLUBS

The club system under the Federal Assistance Policy makes it possible for any district to adopt community breeding and secure the services of good sires at very reasonable service fees. The breeders of some provinces have profited by this policy and through it are raising the standard of the horses particularly by the use of better sires. Clubs are also breeding a better class of mares. That the colts are being better looked after in many districts is evident from the fact that many clubs are holding colt shows at which good prizes are given. Trophies and prizes are also put up at country fairs and keenly competed for. Club or community breeding is also helping to centralize the raising of certain types and breeds in districts which in turn aids co-operative marketing. Districts known to produce a certain type of marketable horse are sure of buyers. Buyers go where they can most readily secure what they want with the least trouble and in the largest numbers.

In some districts under club auspices horse sales have been held which are reported to have been quite satisfactory. It is the intention to make these sales an annual event and in this way advertise widely the fact that horses of a certain kind and type may be obtained in certain numbers. These sales like the colt shows not only tend to promote better breeding but also better feeding, care and management.

CATTLE DIVISION

THE DISTRIBUTION OF PURE-BRED BULLS

The Live Stock Branch has been loaning pure-bred bulls to specially organized associations in newly-settled districts and in backward sections in the older provinces since 1913. The number of bulls so loaned up to November 1, 1920, total 2,963.

Until 1920, all bulls loaned were purchased direct from breeders, it having been considered that for the branch to invade even the larger sales with its heavy annual requirements would lead to complaint from private bidders. In 1920, however, it became apparent that the breeders entering bulls in the provincial sales in Western Canada were entitled to more support than they were likely to get from private demand in view of the unusual feed conditions which had prevailed during the preceding ten months and of the uncertainty regarding the market outlook for beef. Accordingly, the branch decided to give the fullest measure of support possible to these sales by endeavouring to supply its requirements at them. The step proved most opportune and the branch was able to secure an excellent lot of bulls at good values. The support given was highly appreciated by contributors to the sales as it was

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unquestionably instrumental in maintaining a good average on the better bulls offered, all of which had been grown and fitted on very expensive feed. At the seven sales in the three Prairie provinces 225 bulls were purchased by the branch at an average price of \$230.

In the following table will be found the total number of bulls now standing with associations in each province:—

TOTAL NUMBER OF BULLS IN HANDS OF ASSOCIATION.

Breed	B.C.	Alta.	Sask.	Man.	Ont.	Que.	N.B.	N.S.	P.E.I.	Total
Shorthorn.. . . .	31	270	225	115	71	60	....	9	4	795
Ayrshire.. . . .	11	2	2	....	8	150	23	16	5	217
Holstein.. . . .	8	7	6	6	18	28	11	5	1	90
Hereford.. . . .	1	28	34	8	1	2	....	....	....	74
A. Angus.. . . .	4	11	16	7	....	....	....	....	....	38
F. Canadian.. . . .	....	....	....	....	....	25	....	....	....	25
Jersey.. . . .	13	....	....	....	....	1	1	2	....	17
Guernsey.. . . .	5	....	....	....	....	....	....	4	....	9
Red Polled .. . . .	....	....	2	1	....	....	....	....	....	3
Galloway.. . . .	1	....	....	....	....	....	....	....	....	1
	74	318	295	137	98	266	35	36	10	1,269

Bulls in Feed Stations—									
Shorthorn .. . . .	....	....	....	....	....	....	....	....	19
Hereford .. . . .	....	....	....	....	....	....	....	....	13
Angus .. . . .	....	....	....	....	....	....	....	....	7
Red Polled .. . . .	....	....	....	....	....	....	....	....	1
									40
Total number of Bulls on Hand.. . . .									1,309

CAR-LOT POLICY

Under the terms of this policy the Live Stock Branch pays reasonable travelling expenses of farmers residing in Canada who purchase stock at Central Stock Yards for return to country points. In Eastern Canada the assistance rendered is confined to purchases of female breeding stock—cattle, sheep, or hogs. In Western Canada the policy covers stocker and feeder cattle in addition to breeding stock. Purchasers are required to fulfil certain requirements of the department in connection with their shipments and to give satisfactory assurance that none of the stock is being purchased for speculative purposes.

This policy has proved a very valuable educational agency in that its terms have encouraged farmers from all over the country to visit the stock yards and to become acquainted with methods of doing business at these points, and has unquestionably played a very important part in encouraging a return of unfinished cattle and sheep to country points for further feeding and also in the return of young female breeding stock, particularly from yards in Western Canada.

The policy has been in effect at the stock yards of Western Canada since the fall of 1916. On the yards at Toronto and Montreal it has been in effect only since May 1, 1918. Total shipments made each year under its terms are given in the following table:—

CAR-LOT POLICY SHIPMENTS TO JANUARY 1, 1921.

Year	Steers	Heifers	Sheep
1916 (3 months)	6,208	3,113	1,407
1917.. . . .	11,334	10,411	1,800
1918.. . . .	20,703	18,745	7,978
1919.. . . .	22,490	17,350	9,408
1920.. . . .	14,009	7,957	6,317
	74,744	57,776	26,910

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The policy has not been an expensive one, as is indicated by the fact that the cost to the department of all cattle shipped under its terms during a period of three years averaged only 59 cents per head. The average cost of all sheep shipped during the same period was only 18½ cents per head.

FREE FREIGHT POLICY

The Free Freight Policy, which has been in operation since the fall of 1917, was inaugurated by the Livestock Branch in co-operation with the railway companies of Canada, with a view to preventing, as far as possible, the slaughter or exportation of useful heifers, young ewes and young sows offered for sale on the open market at the Central Stock Yards. Under this policy, farmers are entitled to ship from stock yards to country points female breeding stock, of the classes mentioned, without payment of freight charges on same, provided the stock was not purchased for speculative purposes.

During the time the policy has been in operation it has been very widely taken advantage of by farmers anxious to secure breeding stock, and it has unquestionably been one of the most important factors in promoting the return to country points of a large percentage of useful females offered on the yards at Edmonton, Calgary, and Winnipeg. Since the inception of the policy, September 21, 1917, shipments under its terms from the different yards up to January 1, 1921, numbered as follows:—

Name of Yard	Heifers	Ewes	Sows
Edmonton.. . . .	24,086	8,561	155
Calgary.. . . .	21,949	72,512	..
Winnipeg.. . . .	20,097	9,206	203
Prince Albert.. . . .	51	100	..
Moose Jaw.. . . .	61	..	..
Toronto.. . . .	1,872	10,084	..
Montreal.. . . .	164	452	11
	68,280	60,976	369

SPECIAL RELIEF POLICY

Certain sections of Western Canada having again, in the season of 1919, experienced a crop failure as a result of drought, a further measure of assistance to stockmen in the dried-out areas became necessary. To meet this situation the Special Relief Policy, which is similar in effect to the one in force in 1918, was put into operation on August 2, 1919.

Under the policy of 1918 the federal department, through the Live Stock Branch, shared equally with the railways the freight on shipments under the terms of the policy. The policy of 1919 differed, however, in that the provincial departments participated, the charges on feed and haying outfits being shared equally between the federal department, the provincial departments and the railway companies. On shipments of stock to the feeding grounds the federal and provincial departments divided the freight equally, except in Saskatchewan, where the freight was paid by the shipper; on return shipments of stock the railways paid fifty per cent of the charges, the federal and provincial departments each paying twenty-five per cent. The foregoing arrangement applied on the Canadian Pacific, the Canadian National, and the Grand Trunk Pacific Railways. The freight charges on both haying outfits, feed and stock shipped over the Edmonton, Dunvegan and British Columbia, and the Algoma and Great Waterways railways were shared equally by the Federal and Alberta Governments.

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The movement in Alberta in the 1919 season included some 200,000 tons of feed, 25,000 head of stock, and 340 cars of haying outfits. Shipments in Saskatchewan comprised some 110,000 tons of feed, 2,730 head of stock, and 825 cars of haying outfits. As Manitoba was not seriously affected by drought the movement in that province was comparatively slight.

Owing to the fact that complete accounts have not yet been received from the railways it is impossible at this date to quote exact figures. It is estimated, however, that the cost of the 1919 policy to the Federal Government will approximate that of the 1918 season, namely, one-half million dollars.

RECORD OF PERFORMANCE

The demand for pure-bred sires is continually increasing and as the tendency to do away with scrub sires becomes more general, there should be in the near future, a place for all pure-bred males of good breeding. The Record of Performance test furnishes an invaluable guide to purchasers of dairy sires in the selection of animals which can be depended upon to improve their herds.

Although farmers in some districts, owing to feed conditions, have been compelled to withdraw their cows, there are at present more than two thousand cows entered for the test, which is a greater number than at any previous time.

Owing to the increased number of herds to be visited it has been found necessary to engage additional inspectors.

Three of the breed associations, viz., Ayrshire, Holstein-Friesian and Shorthorn, have adopted a 305-day test in addition to the original Record of Performance test of 365 days. The 305-day test will prove of great benefit to the breeder who desires his cows to freshen regularly each year, whereas the 365-day test will give high-producing cows every opportunity to make a maximum record.

Following is a summary of the number of cows entered in the Record of Performance during the past year and the number of certificates issued for bulls and cows during the same period, also the number of cows entered for test and cows and bulls which have qualified for certificates since the inauguration of the Record of Performance.

The following is a brief summary of the work for the year:—

NUMBER OF COWS ENTERED FOR THE TEST

Ayrshire	705
French Canadian	35
Guernsey	955
Holstein-Friesian	487
Jersey	54
Shorthorn	170
	<hr/>
	2,406

NUMBER OF RECORD OF PERFORMANCE CERTIFICATES ISSUED

	Cows	Bulls
Ayrshire	289	13
French Canadian	12	1
Guernsey	9	1
Holstein-Friesian	354	18
Jersey	132	6
Shorthorn	101	1
	<hr/>	<hr/>
	897	40

Certificates are being issued for Ayrshire, Holstein-Friesian, and Shorthorn cows whose records have previously appeared in the appendix to the annual report and which have produced sufficient to qualify under the present standards.

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The following is a summary of the number of cows entered and animals which have qualified for registration in the Record of Performance since the commencement of the test:—

	Cows entered	Cows qualified	Bulls qualified
Ayrshire	6,200	1,802	85
French-Canadian	380	99	2
Holstein-Friesian	6,820	2,088	93
Guernsey	274	55	1
Jersey	2,312	566	21
Shorthorn	1,045	370	9
	17,031	4,985	211

SHEEP AND SWINE DIVISION

CO-OPERATIVE SHEEP AND LAMB MARKETING

Following the co-operative marketing of sheep and lambs which had been previously started in Quebec and New Brunswick, the work extended to Prince Edward Island and Nova Scotia this year with considerable additional demonstration work in Ontario. With a larger staff it was possible to do much more effective work and accomplish much more extensive results. As a preliminary to co-operative marketing, a large amount of field work was performed during the winter, spring and summer months. This included the holding of meetings and giving of demonstrations in docking and castrating. The following table outlines the extent of the preparatory work:—

Province.	Meetings.	Attend- ance.	Demon- strations.	Attend- ance.	Lambs trimmed.	Sheep dipped.
Prince Edward Island	25	750	100	900	4,000	10,000
Nova Scotia.....						
New Brunswick.....						
Quebec.....	125	15,000	135	1,200	9,000	10,000
Ontario.....	71	900	109	300	600	16,000
Total	221	16,650	344	2,400	13,600	36,000

The co-operative marketing of sheep and lambs commenced the latter part of August and continued through the fall months. As a result of supplying food on long hauls the shrink was kept remarkably low. This was particularly noted in shipments from the Maritime and from the Lac St. Jean District in Quebec.

The Maritime shipments were all converged at Moncton, N.B., and forwarded from there by special freight. The volume of business already warrants a through live stock freight which is being negotiated for next year's work and when secured will reduce very considerably the time in transit. The shrinkage on Maritime lambs ran from three to twelve pounds and for the entire shipments would average eight pounds per head. The selling charges, including freight, ran from \$1.87 per cwt. up to \$3, depending on the shrinkage. The returns made to farmers in some cases were as high as four cents above local prices, while in other cases the local buyers raised their prices very close to co-operative figures. On the whole the gain to farmers would be in the neighbourhood of two cents a pound.

The selling charges on shipments from Quebec varied from 75 cents up to \$2 per cwt. depending on distances from Montreal. Shrinkages ran from 3½ to 11¼ pounds depending on distance to market and would average between seven and eight pounds for all shipments.

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SUMMARY OF CO-OPERATIVE MARKETING OF SHEEP AND LAMBS.

Province.	No. of Cars.	Total No. of Head.
Prince Edward Island	49½	4,607½
Nova Scotia	19½	1,791½
New Brunswick	55½	5,269½
Quebec	61	6,632
Total	186	18,299

GRADES AND PRICES.

Province.	No. 1 Lambs.	Price Range.	No. 2 Lambs.	Price Range.	Good Sheep.	Price Range.	Common Sheep.	Price Range.
		\$		\$		\$		\$
New Brunswick...	1,939	10.50-13.50	1,609	8.60-12.10	244	5.00-7.50	1,477	4.40-7.50
Nova Scotia.....	1,392	11.25-13.00	250	8.25-11.25	68	5.00-6.25	81	4.00-6.00
Prince Edward Is.	3,124	11.70-13.10	843	10.00-12.10	343	6.00-7.10	297	5.50-6.50
Quebec	4,538	12.25-13.50	1,621	10.50-11.75	270	6.00-7.00	203	4.20-5.10
Total	10,993		4,323		925		2,058	

CO-OPERATIVE SWINE AND CATTLE MARKETING

As a result of co-operative sheep and lamb marketing, requests arose for the co-operative marketing of cattle and hogs and as there was no other avenue through which such stock could be marketed, it was decided to handle them in conjunction with the sheep and lamb shipments. The swine shipments consisted of 21½ cars from Prince Edward Island with half a car from New Brunswick. A total of 1,427 head were handled, 1,240 of which graded selects, 63 lights, 63 heavies, and 61 sows and stags. The top price received for select hogs was 21 cents per pound. Lights brought 14 cents to 18 cents per pound and sows and stags ranged from 15½ cents down to 12 cents. The average shrinkage on hogs was 14 pounds per head and the selling charges, including freight, averaged in the neighbourhood of 2 cents per pound. Had it not been for the movement of these hogs to a regular market point the local markets in the Maritime Provinces would have been heavily loaded, resulting in serious loss to the producers, especially in view of the fact that many of the hogs were raised and finished for the most part on high priced feeds.

Cattle were marketed from New Brunswick, Nova Scotia, Prince Edward Island, and Quebec. 22½ cars or a total of 651 head were shipped from New Brunswick, 24½ cars or 784 head, from Nova Scotia, 6 cars, or 152 head, from Prince Edward Island and 15 cars from Quebec. Owing to the fact that the cattle market was dull during the fall months, farmers were encouraged to cater to the local demand and only offerings that could not find a local market were handled.

ORGANIZATION OF RAM CLUBS AND COMMUNITY BREEDING CENTRES

Following the organization of a few ram clubs in Quebec last year, the work was extended this year and twelve new clubs were organized, resulting in the collective purchase of 275 pure-bred rams and 50 pure-bred ewes. In each club only rams of one breed are introduced and in as far as possible a minimum of twenty-five rams are placed in each community. As a result of clubs organized last year, it was possible to secure some very choice car lots of uniformly bred lambs, which topped the market at three-quarters to a cent a pound above ruling prices. The community purchase of

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rams of one breed permits the purchasers to exchange among themselves at the end of two years, thus allowing for full use of the rams with a minimum of expense. In addition to the purchase of rams, the clubs were encouraged to purchase a few ewes in order that foundation flocks might be established with a view to supplying a part at least of the pure-bred needs of the communities. The Premium Policy has been a big factor in making the organization of these clubs possible. When once organized, club members elect a purchasing agent who is assisted in making the selection of the rams and ewes. The following table shows the number of rams purchased by breeds:—

No. of Clubs	Breed	No. of Rams	No. of Ewes
5	Shropshire.....	125	33
5	Oxford Down	125	—
1	Hampshire	15	17
1	Leicester	10	—
<hr/> 12		<hr/> 275	<hr/> 50

GRADING OF PURE-BRED RAMS

As a result of ram grading which was performed for the first time in New Brunswick last year, the sheep breeders in Nova Scotia and Prince Edward Island requested similar assistance this year, thus extending the work to the three Maritime Provinces.

The grading of pure-bred rams as already carried out is having the effect of establishing confidence between the breeder of pure-bred sheep and the purchasers of rams for stud purposes. It is tending to standardize breed types and raise the general excellence of pure-breds, besides producing a marked improvement in the quality of market stock raised within the provinces where grading has been done.

The rams of the three grades were distinguished by tattoo marks placed in the ear of the sheep. For the first grade there were three marks, the second two marks, and the third one mark. The rams placed in the first grade were rams of high merit, considered typical of the breed to which they belonged and suitable for the heading of pure-bred flocks. Rams of the second grade were in most cases good individuals, but lacking in some respect all that would be looked for in a ram of the first grade. Rams of the third grade were animals considered to be fit only for the shambles.

During the season of 1920, a total of 325 rams were graded in the provinces of New Brunswick, Nova Scotia and Prince Edward Island. Of this number 136 were placed in the first grade, 168 in the second grade, and 21 in the third grade. A detailed statement is herewith attached.

STATEMENT OF RAM GRADING IN THE MARITIME PROVINCES FOR 1920

Province.	Oxford.			Shropshire.			Leicester.			Southdown.			Cheviot.			Hampshire.			Dorsethorn.			Cotswold.			Total.
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	
New Brunswick	28	30		1	45		8	14	1																134
Nova Scotia	24	24	2	38	28	13	7	2	2	6			3	1		1		5					2		154
Prince Edward Island	1	2		2	5	3	2	4		3	2		2			6		4		1					57
Total.	53	56	2	41	78	16	17	20	3	9	2		5	1		7		9		4			2		325

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CO-OPERATIVE MARKETING OF WOOL

The policy of grading wool for wool growers' associations in Canada was continued during 1920. A considerable change occurred this year in that a greater centralization of the wool clip was arranged, thus allowing closer supervision of the grading, and the turning out of a more uniformly graded product. All the wool from the western provinces was graded at Weston, Ont., while the eastern wools were handled at Guelph, Shawville, Lennoxville, Fredericton, Truro, Antigonish, Port Hood, and Charlottetown.

During the grading season of 1920 six qualified wool graders were employed temporarily, and these in addition to the two permanent graders on the staff, performed all the grading for all associations in Canada. From the experience gained this year under the new conditions of centralization, it has been possible to put this phase of the work of the Division on a more efficient basis. Many expressions of appreciation as to the uniformity of the grades of wool have already been reported, and it is hoped that, by continued close supervision of the grading work, greater confidence will be established in Canadian wool grades, and that, as a result of this confidence, Canadian mills will use more home grown wools, and a more extensive demand be created in other markets.

Another feature of this year's work was the filing of copies of all grading statements and the indexing of all shippers. This was done with the idea of having complete data readily available as to the amount of wool graded, how it was graded and the number and location of shippers. This data enables the division to make a complete analysis of all shipments, and will be the basis of talks and demonstrations on wool improvement.

Owing to a falling market for wool which prevailed throughout the entire season, it was necessary to exercise more strictness in keeping the grades up to a higher standard than was necessary during the war period. All shippers were advised by circular letters of the necessity of taking this step. As a result of closer grading, the grades have been acceptable to the trade, and although the market was dull sales were made from week to week, finally resulting in the disposal of the entire clip of graded wool at satisfactory prices considering the season.

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TOTAL WOOL GRADED BY ASSOCIATIONS AND PROVINCES

Province.	Association.	Association Total.	Province Total.
Prince Edward Island	Prince Edward Island Sheep Breeders.....	51,859	51,859
Nova Scotia.....	Inverness Wool Growers.....	12,972	
	Nova Scotia Wool Growers.....	57,132	
	Antigonish Wool Growers.....	33,560	103,664
	New Brunswick Wool Growers.....	69,983	69,983
New Brunswick.....	Pontiac Wool Growers.....	51,057	
Quebec.....	Quebec Branch, Lennoxville.....	159,490	210,547
	Ontario Sheep Breeders.....	620,595	
	South Manitoba Association.....	17,568	
	Man. Marketing Association.....	21,514	
Ontario.....	Sundry Shipments.....	20,215	679,892
	Manitoba Branch Canadian Co-operative..	370,872	370,872
	Saskatchewan Branch Canadian Co-operative..	684,127	
	South Saskatchewan Wool Growers.....	181,048	865,175
Manitoba.....	Central Alberta Wool Growers.....	52,669	
	Alberta Provincial Sheep Breeders	151,551	
	Alta. Sheep Breeders.....	315,410	
	South Alberta Wool Growers.....	1,479,312	
	Vermilion Wool Growers.....	37,026	
	Western Stock Ranches, Ltd.....	16,424	
	Lethbridge Sheep Company.....	15,968	
	Sarnia Ranching Company.....	37,653	
	Sundry Shipments.....	51,740	2,157,753
	Interior British Columbia Wool Growers.....	176,475	176,475
Saskatchewan			
Alberta.....			
British Columbia.			
	Grand total.....		4,686,220

PREMIUM POLICY

The first premium has been paid on six hundred and nineteen applications under this policy and the introduction of this number of pure-bred rams for the first time on farms throughout the Dominion has proved to be one of the most effective means of eliminating the scrub ram and improving the quality of market lambs. The clause covering docking and castrating under this policy has also been a very effective means of bringing about the general trimming of lambs, especially in the districts that were most backward in this regard. As a result of requests and the consequent holding of many demonstrations in docking and castrating, it was possible to reach not only farmers that had received the bonus, but many others as well, thus educating them to the benefits of these operations. Inspections were made or reports received on all flocks affected by the policy and with few exceptions the conditions were complied with. New applications for this year will be in the neighbourhood of 500.

The following table gives the number of applications for premiums received from each province, indicating also the breeds of rams purchased:—

Breed.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.
Shropshire.....	22	21	19	84	27	1		11	2
Leicester...	9	1	13	62	12	1	1		
Oxford.....	6	13	35	71	74	10	6	13	2
Hampshire.....	2	5	7	31		1			2
Lincoln....	2		3	2	6				
South Down ...	4								
Cotswold.	1	1	2	1	2				
Cheviot..		1	9	10	1				
Dorset..			5		5				
Suffolk.....							1	1	1
Total.....	46	42	93	261	127	13	8	25	7

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DISTRIBUTION POLICY FOR PURE-BRED RAMS AND BOARS

The distribution policy has now been in operation for eight years and as a result of the introduction of the pure-bred ram in most districts throughout the Dominion and especially in view of the fact that the premium policy has encouraged many farmers to purchase pure-bred rams it was not considered good policy to encourage the extensive loaning of rams or boars during the past year, consequently few new rams and boars were distributed. Greater discrimination was exercised in dealing with new applications and only those accepted that came from districts where returned soldiers were settling, newly settled districts or districts where improvement of sheep and swine was considered essential. A number of the rams and boars already loaned had either outlived their period of usefulness or had been two years with associations. The older animals were sold for the block and those that gave evidence of further usefulness were either sold for breeding purposes, exchanged between associations or transferred to new associations where applications had been accepted. The rams loaned have effected a decided improvement in the breeding of the flocks and quality of the market lambs in which they have been used and as a result of their use, farmers who are now in reasonably good circumstances are willing to purchase a ram in the regular way.

In view of the recent developments of interest in swine-raising, there is an increasing demand for the loan of boars in districts that are now changing from out and out grain farming to mixed farming with more live stock. Settlers in such districts are for the most part new to the raising of swine and the distribution of boars in such districts is having a particular value in improving the bacon type of hog.

STATEMENT OF RAMS LOANED UNDER DISTRIBUTION POLICY

Province.	Oxford.	Shropshire.	Leicester.	Lincoln.	Hampshire.	Cheviot.	Suffolk	Total.
Quebec.....	50	110	137	1	33	10		341
Ontario.....	15	15	30	7				67
Manitoba.....	56	9	3					68
Saskatchewan.....	1		1					2
Alberta.....	6	18						24
British Columbia.....	3						1	4
Total.....	131	152	171	8	33	10	1	506

STATEMENT OF BOARS LOANED UNDER DISTRIBUTION POLICY

Province.	Berkshire.	Yorkshire.	Duroc.	Chester.	Tamworth.	Poland China.	Total.
Prince Edward Island.....	2						2
Nova Scotia.....		2					2
New Brunswick.....	1						1
Quebec.....		24		8	1		33
Ontario.....	1	10					11
Manitoba.....	5	2					7
Saskatchewan.....	5		4				9
Alberta.....	10	1	5			1	17
British Columbia.....	6	1	2	1			10
Total.....	30	40	11	9	1	1	92

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INVESTIGATIONAL ACTIVITIES

During the year the application of legislation relative to grazing areas in Western Canada was investigated, also grazing areas available for sheep pasturing both in Eastern and Western Canada. As a result of these surveys there would seem to be ample opportunity for the extension of semi-range flocks in many districts, more particularly the northerly and rougher sections of Eastern Canada, as well as in the foothills of the Rockies, plateaus in British Columbia and in gullies and valleys adjacent to creeks and rivers in Alberta, Saskatchewan, and Manitoba. The application of existing legislation for the protection of sheep against dogs was also investigated. A summary of existing Acts was prepared and improvements suggested. The importation and sale of foreign mutton and lamb was followed closely and an outline of proposed regulations for controlling the importation and sale of foreign mutton and lamb has been prepared.

Feeling that more should be known about qualities of Canadian wools, a sorting test was conducted with each grade in all the provinces. This is being followed up with a scouring test. The sorting test acts as a check on the efficiency of the grading and suggests where improvement can be effected in breeding for superior wool qualities. The scouring test will aid in a more accurate determination of relative grade values for the wools of each province. It will also act as a safeguard in establishing prices for both buyers and sellers of wool, since the percentage of scoured wool is always calculated when establishing the grease value.

SHEEP AND SWINE EXHIBITS

The sheep and swine exhibits which were displayed at a number of eastern and western fairs were designed with the purpose of encouraging the greater home consumption of lamb and the production of the ideal Wiltshire bacon side for export. The exhibits displayed an ideal side of lamb showing the proper method of cutting and preparing the various cuts of the lamb carcass. The importance and value of lamb as a summer meat were also emphasized. Wool grades and values, common sheep diseases and treatments, and models of sheep equipment necessary in good sheep management were also displayed, as well as a comparison of the good and common classes of live sheep and lambs found on our markets.

A model of the ideal Wiltshire side was contrasted with overfat and lean sides of bacon, with a view to emphasizing the importance of the export trade and the value of the swine industry to the farmers of Canada.

ENCOURAGING CO-OPERATIVE WOOL MARKETING

Many demonstrations were given on the preparation of wool for market with a view to having the fleeces put up in a more attractive form for sale and to encourage grading and co-operative sale. Shearing demonstrations illustrated the proper method of shearing sheep and the rolling and tying or boxing of fleeces. Dipping demonstrations were also given at which some 36,000 sheep were dipped. The dipping demonstrations have improved wool qualities by adding strength and softness to the fibres, thus increasing the market value of the product. In addition, the thriftiness of the flocks is improved, thus reducing the cost of maintenance. Farmers are realizing more and more the importance of dipping and the practice is becoming much more general. As the shearing and dipping demonstrations were for the most part held in conjunction with docking and castrating demonstrations, they are included in the table given under "Co-operative Sheep and Lamb Marketing."

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POULTRY DIVISION.

The activities of the Poultry Division embrace, in so far as possible, the National Poultry Policy as outlined by the Live Stock Branch and approved by the Canadian National Poultry Association. One of the ideas is to maintain such a high standard and uniformity of quality that once our produce has been purchased it will in and of itself create a demand for more. Furthermore such articles must be produced, conserved and handled on a basis of cost that will permit them to compete successfully with other similar products. Necessary volume of the proper quality or grade is an essential factor in cost.

In other words, the plan is to give the Canadian poultry industry business management on a national scale. While the result of these activities has been more or less apparent for some time, the real cumulative effect has been most pronounced during 1920 when, through markets intelligence, co-operation in marketing, the sale of a standardized product, competition created among buyers, and the introduction of new buyers into old markets, producers have been able to obtain a higher percentage of the ultimate selling price than ever before.

The National Poultry Policy is as follows:—

1. Standardized product—Government inspected and guaranteed.
2. Markets intelligence, giving an assurance of price.
3. Co-operative marketing.
4. Economic production—through stock improvement.
5. Increased production.
6. Quality payment.
7. Service in transportation.
8. Perfection in storage.
9. Increased consumption.
10. Advertising and salesmanship in the disposal of the product at home and abroad.

THE ADMINISTRATION AND ENFORCEMENT OF THE EGG REGULATIONS

For purposes of administration, Canada is divided into two sections viz., Eastern and Western. The Eastern section covers Ontario east of Port Arthur, Quebec and the Maritime Provinces. The Western section covers territory west of the Great Lakes, including Port Arthur. The following tables give a comparative record of inspections for the years 1919 and 1920.

TABLE 1.—STATEMENT OF INSPECTIONS EASTERN SECTION.

Months.	Number inspections during month.		Number shipments not approved during month.		Number approved to date.		Number cases inspected during month.		Number cases inspected to date.	
	1919	1920	1919	1920	1919	1920	1919	1920	1919	1920
January.....	7	14	.....	8	7	6	2,406	3,091	2,406	3,091
February. . .	.....	1	.....	.....	7	7	.....	500	.....	3,591
March.....	22	.....	1	.....	28	7	7,640	.....	10,046	3,591
April.....	29	27	2	.....	55	34	11,141	10,948	21,187	14,539
May.....	52	62	5	2	102	94	23,298	22,608	44,485	37,147
June.....	34	93	2	4	134	183	12,418	28,373	56,903	65,520
July.....	27	75	1	1	160	257	9,070	20,370	65,973	85,890
August.....	32	94	.....	8	192	343	9,536	29,573	75,509	115,463
September.....	94	133	7	20	279	456	40,019	44,832	115,528	160,295
October.....	140	187	12	16	407	627	59,040	66,427	174,568	226,722
November.....	110	166	12	11	505	782	41,757	54,278	216,325	281,000
December.....	46	46	2	1	549	827	13,128	15,907	229,453	296,907

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TABLE 2.—STATEMENT OF INSPECTIONS WESTERN SECTION.

Months.	Number inspections during month.		Number shipments not approved during month.		Number approved to date.		Number cases inspected during month.		Number cases inspected to date.	
	1919	1920	1919	1920	1919	1920	1919	1920	1919	1920
January.	4	14	2	2	2	12	1,433	6,405	1,433	6,405
February.		3		2	2	13		1,020		7,425
March.					2	13				7,425
April.	61	23		4	63	32	26,421	9,047	27,854	16,472
May.	63	64		8	123	88	27,794	26,722	55,648	43,194
June.	46	52		3	169	137	10,201	20,949	74,849	64,143
July.	57	42	10	5	216	174	23,271	17,341	98,120	81,484
August.	18	23	5	5	231	192	6,414	8,164	104,534	89,648
September.	18	25	2	5	247	212	5,890	7,613	110,424	97,261
October.	33	33	2	3	278	242	14,257	10,128	124,681	107,380
November.	19	31	2	5	295	268	7,383	12,162	132,064	11,9551
December.	12	32	2	5	305	295	5,341	12,546	137,405	132,097

TABLE 3.—STATEMENT OF INSPECTIONS EASTERN AND WESTERN SECTIONS COMBINED.

Months.	Number inspections during month.		Number shipments not approved during month.		Number approved to date.		Number cases inspected during month.		Number cases inspected to date.	
	1919	1290	1919	1920	1919	1920	1919	1920	1919	1920
January.	11	28	2	10	9	18	3,839	9,496	3,839	9,496
February.		4		2		20		1,520		11,016
March.	22		1		30	20	7,640		11,479	11,016
April.	90	50	2	4	118	66	37,562	19,995	49,041	31,011
May.	115	126	8	10	225	182	51,092	49,330	100,133	80,341
June.	80	145	2	7	303	320	31,619	49,322	131,752	129,663
July.	84	117	11	6	376	431	32,341	37,711	164,093	167,374
August.	50	117	3	13	423	535	15,950	37,737	180,043	205,111
September.	112	158	9	25	526	668	45,909	52,445	225,952	257,556
October.	173	220	14	19	685	869	73,297	76,555	299,249	334,111
November.	129	197	14	16	800	1,050	49,140	66,440	348,389	400,551
December.	58	78	4	6	854	1,122	18,469	28,453	366,858	429,004
Total	924		70		854		366,858	(1919)		
Total	1,240		118		1,122		429,004	(1920)		

TABLE 4.—SUMMARY OF INSPECTIONS WESTERN SECTION (PRAIRIE PROVINCES).

	1919	1920
	Jan. 1-Dec. 31 inclusive	Jan. 1-Dec. 31 inclusive
Number of cars inspected	332	342
Number shipped Montreal	74	72
Number shipped Toronto	33	53
Other Ontario points	—	25
Number shipped to British Columbia	91	44
Number exported direct	26	55
Number moved interprovincially between Prairie Provinces	78	46
Number not approved	30	47

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TABLE 5.—COMPARATIVE STATEMENT EXPORT SHIPMENTS

	1919	1920
January	—	900 cases
February	—	500 "
March	7,620 cases	— "
April	8,405 "	— "
May	18,523 "	400 "
June	4,995 "	5,450 "
July	4,745 "	13,545 "
August	6,421 "	26,823 "
September	33,969 "	38,081 "
October	57,415 "	62,970 "
November	34,397 "	49,735 "
December	10,200 "	12,459 "
	186,690 cases	210,862 cases

The Egg Inspection Service during 1920 was called upon to make 1,240 inspections, covering 429,004 cases of eggs; of these 210,862 cases were exported to Great Britain, 77,391 cases being fresh eggs, and the balance, 133,471 cases, storage cases.

In table No. 4, a substantial increase will be noted in the requests for inspection during 1920 as compared with 1919. The significance of this increase is to be specially noted in so far as the attitude of the trade generally is concerned towards the principle of government inspection. Ninety-six inspections were made for local shipments, that is ninety-six were voluntary inspection, produce dealers and packers bought from track shippers and country dealers on a graded basis, subject to government inspection, thereby applying the principle of quality payment and recognizing that the system of government inspection creates a bond of mutual confidence, is absolutely impartial, and safe-guards the interests of buyer and seller alike. The buyer is given a guarantee of quality through the medium of the inspection certificate, and the markings placed on the case; the seller's interest is safeguarded through the work of inspection being done at the point of shipment and at the time of shipment. Inspection is by approval, the shipper being required to handle and grade the eggs according to the Canadian Standards, marking the cases with the class and grade contained therein. When ready for shipment a requisition for inspection is made to the Department and the Inspector at the nearest point is directed to attend as requested, who calls upon the manager of the business for particulars of the shipment.

The method employed in inspection is to draw at least a 5 per cent sample from various portions of the lot prepared for shipment, in order that the sample may be as fully representative as possible. Upon examination if the inspector finds the eggs up to the grade marked on the cases, the shipment is approved, certificate issued, and the cases marked with the Government mark of approval. This method of inspection is highly commended by the British importer, and it is largely due to the efficiency of the system and the ability of the Inspectors employed, that Canadian eggs are receiving a distinct premium on the British market.

In addition to actual egg inspection, Inspectors are required to note the temperature of rooms from which eggs are taken, the condition of the eggs as to defrosting and sweating, outside temperature, temperature of car, (if iced) into which eggs are loaded, manner of loading, weather conditions and any other points incidental to handling and transportation. Inspectors at seaboard are kept advised of shipments rolling to seaboard for export and are required to report on condition on arrival, particulars on handling, loading and stowing aboard ship. Further they must keep in touch with market conditions and changes and make a daily report to the Chief of the Poultry Division.

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Constant activity is necessary to obtain definite information that will enable the Department, in co-operation with the trade to introduce improved methods of marketing that will eliminate preventable loss. Any abuse found in the system of marketing can only be eliminated by removing or remedying the underlying cause.

From the experience gained during the past season, it is apparent there is need for a standardized filler; reports have been received on consignments arriving in Great Britain in bad condition through breakage, and invariably light weight fillers are mentioned as a contributing cause. Owing to the high price of paper, many exporters have been forwarding their shipments in fillers of light weight that were used in storage. Where eggs have been transferred into heavy fillers, their arrival in Great Britain is reported in perfect condition.

There have been two prosecutions during the current year for violation of the egg regulations, judgments in each case being given in favour of the Department. The fact that the law states that no person can ship or accept for shipment, eggs covered by the regulations, unless the requirements of the regulations are complied with, reduces to a minimum the number of infractions.

EGG AND POULTRY MARKETS REPORTING

The extension of this work has been further developed. About a year ago a tri-weekly market service with Edmonton and Winnipeg as points of distribution, was inaugurated for western Canada. This service has now been discontinued as a better way to reach a larger number of the interested public at less cost has been found. The daily market wire is now distributed through the medium of the Canadian Associated Press, and through this agency it is possible to place the report in the hands of the editors of all important newspapers from coast to coast, the only charge to the department being the cost of the collection of the markets intelligence contained in the report. Practically all important newspapers in Western Canada now publish this daily report, and many newspapers in the east are also using it. In the case of the eastern press the information is in some cases taken from our daily wire and rewritten to suit a particular paper's requirements. When this is done the department loses credit for the information supplied.

The Weekly Egg and Poultry Markets Report is still published and now has a mailing list of some 5,500. It is worthy of note that requests for this report have been received from ninety-five British egg-importing houses, and additional requests are still being received weekly from Great Britain.

The need for distribution of accurate and up to the minute egg and poultry market information is just as apparent to-day as when the work was first inaugurated. It is impossible to get unbiased reports from the trade as they are naturally anxious to buy at as low a figure as possible. The same applies to country shippers for the opposite reason. Every effort is made to make the prices quoted in our departmental market reports cover the full range of prices being paid, and it is gratifying to be able to state that during the past year not more than two or three letters of criticism have been received in this connection, those coming to hand being from members of the trade who stated that in their opinion the prices quoted were at times too high.

Every officer of the Poultry Division is a market correspondent and expected to furnish a daily report on prices, receipts etc., from the points visited. In addition special correspondents are maintained in Vancouver, Calgary, Edmonton, Regina, Montreal, and St. John. The London, Liverpool, and Glasgow markets are reported weekly by cable, and arrangements are being made to receive market information direct from Buffalo, Chicago and New York.

In connection with distribution of United States egg and poultry markets intelligence it is interesting to note, that at certain seasons Canadian buyers of live and dressed poultry have had to materially increase their prices in order to compete

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with the buyers on the Buffalo and New York markets. Many car loads of poultry have been shipped to the States, at prices more remunerative than obtainable on the home market, as a direct result of the markets intelligence distributed daily and weekly by this branch. In consequence of this international competition producers have secured prices commensurate with the cost of feeding and finishing a high quality product.

CO-OPERATIVE MARKETING OF EGGS AND POULTRY

The policy for the encouragement of co-operative marketing of eggs and poultry has been vigorously carried on during the past year, for the reason that co-operative marketing of the product has proven itself one of the most effective means that has been devised to stimulate the poultry industry. It brings the comparatively small producer into direct touch with home and foreign markets in a large way, it gives him a new perspective of the magnitude of the poultry industry, and an active interest in the actual sale and disposal of his own products.

Previous to the advent of co-operative marketing the system of handling eggs in many parts of Canada was antiquated. It is still in many parts. Over a wide area, however, in every province in fact, individual producers have found that even by combining together in groups of two or three and shipping produce direct to a consuming centre, they not only obtained more for their product, but placed in the hands of the consumer a more satisfactory article.

Through departmental assistance an extension of this idea has been possible until in some instances amalgamated producers' associations are not only supplying a considerable portion of eggs for local consumption on certain markets but one single co-operative company, namely the United Farmers Co-operative Limited, of Ontario, has become one of the largest single exporters in the Dominion.

In all during 1920, something over 3,000,000 dozens, roughly 200 cars of eggs, have been marketed co-operatively throughout the Dominion. Of these Prince Edward Island supplied 813,630 dozens, valued approximately at \$374,181; Quebec, 278,700 dozens, value \$142,137; Ontario, 1,201,349 dozens, value \$616,844; Alberta, 175,606 dozens, value \$92,978; British Columbia, 438,000 dozens, value \$280,320.

In Nova Scotia the work is just gaining momentum, a number of isolated shipping units having been organized during the past year.

In New Brunswick the United Farmers' Co-operative Company is taking up the marketing of eggs and poultry as in Ontario.

In Manitoba, very few, if any, eggs are marketed co-operatively as yet, but in Saskatchewan the Saskatchewan Co-operative Creameries during the past year became one of the largest carlot shippers of eggs in the Prairie Provinces.

One of the great advantages of co-operative marketing is that it makes possible a system of "quality payment." The individual producer has a degree of confidence in the grading by his own co-operative company that he has not in the grading by a private corporation or individual produce dealer.

The extension of co-operative marketing is a phase of activity to which the District Poultry Promoters, Promoters of Egg Production, etc., devote the major portion of their time. It is proposed during the next year to extend their activities to include propaganda work among consumers with the object in view of further familiarizing the public with standard grades, and the creating of a still greater demand for a graded product.

RECORD OF PERFORMANCE FOR POULTRY—SECTION "A"

Record of Performance for poultry has completed its first year. The following extract from the Announcement of the Rules and Regulations gives briefly its objects:—

"Record of Performance for poultry is a policy planned to stimulate and facilitate the breeding of standard breeds of poultry along lines of greatly increased individual

and flock production. This has a special significance during the present period of readjustment of prices. Profitable poultry-keeping depends primarily upon the successful correlation of the cost of production and the selling price. The latter is not under the control of the producer. It is by bringing down the production costs by increased production per unit that this correlation can be obtained. Increased production, both in the individual and in the flock, has been shown to be largely a matter of breeding. Trapnest records, used as a foundation for intelligent pedigree breeding, form the basis of such work. Record of Performance has for its object the testing of pure-bred birds and flocks for the purpose of securing for poultry breeders reliable information as to sources of high producing stock."

Table 1 is a summary of the results of the first year. It will be noted that of the total entry of 4,436 birds, some 823, or 18.6 per cent took certificates. Of these, 16.7 per cent took Record of Performance certificates by laying at least 150 eggs in the prescribed 52-week period, and 1.8 per cent took Advanced Certificates by laying at least 225 eggs in the same length of time. The eggs are required to weigh at least two ounces each to qualify for these certificates.

TABLE 1.—SUMMARY OF RESULTS FOR 1919-20.

Birds entered.	Total qualified.	Qualified R.O.P.	Qualified Advanced R.O.P.	Failed to qualify.	Withdrawn.	Died.	Finished year but failed to qualify.
BRITISH COLUMBIA.							
1625.....	381 23.4%	344 21.2%	37 2.2%	1,244 76.6%	938 57.8%	109 6.7%	197 12.1%
ALBERTA.							
24	2 8.3%	2 8.3%		22 91.7%	20 83.4%		2 8.3%
SASKATCHEWAN.							
120	41 34.2%	40 33.4%	1 0.8%	79 65.8%	51 42.5%	9 7.5%	19 15.8%
MANITOBA.							
202	55 27.1%	49 24.1%	6 0.3%	148 72.9%	67 32.9%	22 10.8%	59 29.2%
ONTARIO							
1086	230 21.2%	201 18.5%	29 2.7%	856 78.8%	480 44.2%	78 7.2%	298 27.4%
QUEBEC.							
809	46 5.3%	43 4.9%	3 0.4%	823 94.7%	547 62.9%	92 10.6%	184 21.2%

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TABLE 1.—SUMMARY OF RESULTS FOR 1919-20—*Concluded*

NEW BRUNSWICK.

180	20 11.1%	19 10.6%	1 0.5%	160 88.9%	93 51.7%	22 12.2%	45 25%
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NOVA SCOTIA.

83	2 2.4%	2 2.4%		81 97.6%	62 74.7%	1 1.2%	18 21.7%
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PRINCE EDWARD ISLAND.

246	46 18.7%	41 16.7%	5 2%	200 81.3%	144 58.6%	7 2.8%	49 19.9%
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CANADA (TOTALS).

4436	823 18.6%	741 16.8%	82 1.8%	3,613 81.4%	2,402 54.1%	340 7.7%	871 19.6%
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The rather small percentage of birds which qualified is due to two reasons, chiefly—efficiency of inspection and quality of birds. The latter stands as convincing proof of the need for the work. Some of the more undesirable and less scientific breeders are being weeded out. The value of culling and selection is being shown. Nearly all of the entrants are doing pedigree breeding, many of them for the first time, and as a direct result of Record Performance. Care is taken to impress upon each breeder the extreme importance of this branch of the work. Many individual birds and flocks, which showed poor quality, were withdrawn; a few breeders were dropped for various causes.

That the work has been successful and has met with the approval and support of poultrymen is shown by the fact that 7,511 birds have been entered this year as compared with 4,436 birds last year. This is an increase of 69 per cent. Table 2 gives the entries in both years, arranged according to provinces and breeds of poultry.

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The response from British Columbia and Ontario is particularly encouraging. In the former province the large commercial breeders are taking up the work, and entering large flocks. In Ontario some large entries are also being received, but the bulk of the entries have come from breeders having smaller flocks, and who are consequently in a position to carry on more detailed breeding and pedigree work. Practically all the Canadian agricultural colleges have entered large flocks.

Various colleges and government institutions have tried, by supplying hatching eggs, pedigreed males, etc., to raise the average production of the farm flocks, which at present is only 80 to 90 eggs per bird per year. While good work has been done by this means, all who are so engaged admit that what they are able to do is only a drop in the bucket. What is needed is a National policy extending from coast to coast and enrolling thousands of birds.

The Record of Performance for poultry fills this need. Flocks, entered in widely scattered sections form nuclei from which can be secured stock, the record of which is known. It has been unfortunate in the past for those wishing to improve the production of their flocks, that much stock has been advertised and sold as "bred to lay" or "utility" which was absolutely unworthy of the name. Some breeders were selling stock that was as represented, but with no system of standardization or certification, it was a problem to find such breeders.

EXHIBITS

During the past year exhibits have been staged at forty-seven of the large exhibitions, and poultry shows distributed as follows: Prince Edward Island, 2; New Brunswick, 2; Nova Scotia, 7; Quebec, 1; Ontario, 13; Manitoba, 1; Saskatchewan, 9; Alberta, 7; and British Columbia, 4. Five exhibits are now in use, and on some occasions as many as three exhibits have been staged on the same dates in different parts of the country. It is difficult to arrive at any definite estimate of the number of people visiting these exhibits, but many thousands do so in the course of the year. As a direct result and proof of the interest taken in the exhibits there are the lists of names sent in requesting candling appliances and literature which run into the thousands, and also many requests by letter direct.

Special attention has been paid to illustrating graphically the "Canadian Standards for Eggs"; "The Egg Regulations under the 'Live Stock Products Act'"; "Co-operative Marketing"; "Record of Performance for Poultry"; and the "Importance of Increased Production". In connection with these practical demonstrations have been given in the candling of eggs and the culling of poultry.

At the Toronto exhibition in August last was put on probably the best egg and poultry exhibit ever staged by the department. Candling and culling demonstrations were given daily, and a moving picture was shown illustrating the "Co-operative Marketing of Eggs". Large crowds were attracted to the exhibit daily, and the success attending this particular exhibit points to the unlimited possibilities in exhibit work, particularly through the medium of motion pictures.

MARKETS INTELLIGENCE AND STOCK YARDS SERVICE DIVISION

The object of the Markets Intelligence and Stock Yards Service is to provide the producers with every facility to the intelligent marketing of live stock. This object is being accomplished through federal control of stock yards as prescribed under the Live Stock and Live Stock Products Act, 1917, whereby public stock yards in Canada are subject to supervision as regards construction, equipment and operation; through assistance given by officers of the branch to producers wishing to sell or purchase live stock on public stock yards, and through a Markets Intelligence Service which provides producers with a detailed markets and trade news service, both domestic and export.

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The enforcement of regulations made under the Live Stock and Live Stock Products Act of 1917 has resulted in the bonding of all commission men operating on public stock yards; the organization and reorganization of live stock exchanges; the standardization and approval of the rules and regulations under which live stock exchanges operate; standardization of all charges made on the yards by the Stock Yards Company or by commission men, and improvements in the accommodation for live stock.

In continuation of the policy of supplying the producers of live stock with an official Markets News Service, officers of the branch, located at the central stock yards, at Montreal, Toronto, Winnipeg, Calgary, Edmonton, and Prince Albert, undertook the classifying, grading, and pricing of all live stock offered for sale, obtained detailed information as to the origin and disposition of the stock and procured data on the general condition of supply and demand.

Purchasers of live stock under the Carlot and Free Freight Policies of the branch, were again given every assistance by the stock yards representatives. The activities of the agents greatly facilitated the movement back to country points.

During the year the stock yards agents addressed numerous meetings on the subject of marketing of live stock. The continual expansion of their yard duties, however, allowed of but little absence from the yards.

The Daily Markets Telegraph Service inaugurated in 1919 was continued. This consisted of analysis of the condition of supply and demand, telegraphed over the wires of the Canadian Press Limited for publication in the daily press of Canada. These wires were prepared by the officers at each of the yards, at 11 a.m. and 4 p.m. daily, and appeared the same evening and the following morning in practically every evening and morning paper in Canada. These have already been conceded an important place in commercial circles.

The Inter-Stock Yards Telegraph Service inaugurated during 1919, consisted of an exchange of market wires between stock yards, so that a knowledge of trade conditions on one market might be available on the other market as soon as the day's trading was established. These telegrams were prepared by the stock yards agents after a careful analysis of the conditions of trading and then wired each day as early as possible to other stock yards in Canada. The beneficial effect that the public postings of these wires has upon trading on the open market has already been the subject of much favourable comment. Heretofore only the larger firms which alone could afford to have a private telegraph service, were able to benefit by a knowledge of conditions at other yards.

The stock yards offices again supplied the local daily press, with daily market news letters and representative live stock sales. The need for absolute accuracy in these reports has resulted in a high quality of material being produced and these, together with the extended weekly and monthly analysis of supply and demand have practically supplanted all other sources of markets information. The effect has been the absolute standardization of market reports throughout the Dominion, where, heretofore, many contradictory and unreliable statements of market conditions were circulated.

The weekly markets news service was again prepared and mailed to the agricultural press of Canada, to district representatives of agriculture, to a selected producers' mailing list, and to the various Provincial Departments of Agriculture. This service consisted of an analysis of supply and demand during the current week; statistical tables showing the grading, numbers, average price, price range for bulk of sales, and top price of all live stock offered for sale and, as well, the disposition and comparative receipts of the same. These reports covered separately each stock yards in Canada. Monthly statistical statements and comments on supply and demand during the month, followed up the weekly report. A statement outlining the general

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conditions of supply and demand on the following month of previous years, was also supplied. The object of this was to provide producers with an idea of the normal condition of markets during any one month over a period of years, so that they might liquidate their stock in as intelligent a manner as possible.

Each week, publicity was given to the live stock industry by the distribution of interesting information, on the live stock and allied industries, as regards both domestic and foreign fields. This information is distributed through the regular mailing list and over the wires of the Associated Press.

During the year numerous articles touching on the live stock industry were prepared, either voluntarily or by request, for publication in the farm press.

Statements on local and general live stock conditions were prepared during the year for producers, the packing industry, and such institutions as banks, railroad companies, etc., and memoranda on production, distribution and consumption of live stock and live stock products, both domestic and foreign were prepared for the information of officers of the department.

The division continued the building up of an extensive information service with reference to statistical condition of local production and distribution of live stock; conditions of local production; general condition of live stock production and distribution in Canada; the foreign live stock situation; world's animal food stuffs and feed stuffs situation; import and export trade in live stock and live stock products; and financial conditions in respect to agriculture.

The division continued to undertake the recording of the point of origin, class, grade and sex, of every head of stock offered for public sale at stock yards. It is estimated that the total marketings for the year will be in the neighbourhood of three million head. These records cover the sales made during the past three years and are compiled in such a way as to be of tremendous value in estimating the condition and extension of the marketable surplus either locally, provincially, or nationally, at any period of the year. It is obvious that a policy to bring about better conditions as regards production for markets and marketing will be given excellent direction through the medium of these records. No other country has such detailed information on marketings of live stock.

During the year the Markets Division prepared and distributed all literature in connection with the Canadian Bankers' Competition. Under the terms of the competition, the Department of Agriculture, in conjunction with the Canadian Bankers' Association, offered cash prizes to boys and girls who fed and exhibited pigs and calves at the local fair, under conditions laid down.

In order that the weekly agricultural newspapers and financial and trade journals might have the most up-to-date market information obtainable, a special market wire is prepared on the opening market of each week, by the stock yards representative, and sent to the farm press in time for publication in the current issue. The good opinion which the farm newspapers have of this Market Service is manifest in the fact that this special wire is paid for by the newspapers, and at their own suggestion.

Extension of stock yards service was made during March, 1920, through the appointing of a stock yard agent at the new stock yards, Prince Albert, Saskatchewan. These yards are situated close to one of the most promising feeding areas in Western Canada.

The administration of the policy whereby immature calves offered for sale on public stock yards are subject to condemnation was administered through the Live-stock Commissioner by the stock yards representatives. The enforcement of this regulation has been effective in conserving a great deal of prospective beef to the country.

During 1920 the Markets Division was successful through the co-operation of the Canadian packers, in obtaining weekly statements from the various plants

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throughout the Dominion, covering private or country purchases, by shipping points. As from 40 to 60 per cent of the annual marketings of hogs go through to inspected establishments, the value of the information obtained can be appreciated. This information is recorded in a similar manner as the stock yards sales.

Toward the end of the year the various companies which supply "Patent Insides" or "Boiler Plate" to the local country newspapers, have been provided with a weekly review of the livestock markets. This was undertaken in order to further circulate reliable markets intelligence at country points.

Since the latter part of the year the local branch bank managers have been supplied with a weekly news letter on matters pertaining to the marketing of livestock, the import and export trade in livestock and livestock produce, and other matters which will tend to keep the strong position which the livestock industry occupies in the industrial life of Canada before the country branch bank manager.

The Markets Division undertook the editing and distributing of a weekly analysis of the wool market situation, prepared by officers of the Sheep and Goat Division.

A report was produced covering the marketings of livestock from each shipping point in the Dominion, and distributed during the year. Copies are being mailed to Departmental officials, live stock promoters, officers of the scrub bull campaign, agricultural representatives, agricultural and daily press, agricultural colleges, general livestock organizations and actual livestock producers. A large percentage of the effective literature distributed in connection with the elimination of scrub sires, was founded on the analysis of the livestock situation provided in the report referred to above.

GRANTS TO EXHIBITION ASSOCIATIONS

Grants are made to summer exhibitions on a basis of amount paid out by them in the utility classes of live stock under very definite regulations. Fat stock shows held during the winter are also assisted. The following table shows the amount of money paid out in the various provinces to both summer and winter or fat stock shows:—

Province.	Summer Exhibitions.		Fat Stock Shows.	
	Number.	Total Amount Grants.	Number	Total Amount Grants.
Prince Edward Island.....	1	2,500 00		
New Brunswick.....	1	3,624 50		
Nova Scotia.....	1	2,500 00	1	5,000 00
Quebec.....	5	20,930 64	1	4,292 75
Ontario.....	3	15,000 00	2	10,000 00
Manitoba.....	1	5,000 00	1	5,000 00
Alberta.....	6	21,368 13	3	11,052 41
Saskatchewan.....	4	15,158 75	2	9,151 13
British Columbia.....	3	11,990 01		
Totals.....	25	98,072 03	10	44,496 29

In addition to assisting by money grants the branch arranges for livestock judges at these exhibitions where grants are paid. The salaries and travelling expenses of these men are paid by the branch but the exhibition associations have to pay them at the rate of not less than \$10 a day and their expenses while actually judging. Under such a system the interchange of judges between provinces and between the East and West is facilitated.

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NATIONAL LIVESTOCK RECORDS

An annual grant in addition to printing and stationery is made to the Record Association in order to assist in the registration of pure-bred animals. A staff working directly under the supervision of the branch checks all certificates issued.

THE SEED BRANCH

The work of the Seed Branch is conducted under the divisions—Seed and Feed Testing, Seed Inspection, Seed Markets, Seed Purchasing Commission, and Feed Division. Within the past year the laboratory service has been extended to test feeding stuffs both in the ground and unground state, and a Feed Division has been organized to administer the Feeding Stuffs Act, 1920.

The inspection service now includes both seed and feed inspection, and for purposes of administration Canada has been divided into six inspection districts. District inspectors are assigned headquarters at Truro, N.S., for the Maritime Provinces, Quebec city for the province of Quebec, Ottawa for eastern Ontario, Toronto for western Ontario, Winnipeg for Manitoba and Saskatchewan, and Calgary for Alberta and British Columbia. Permanent and seasonal seed and feed inspectors are assigned to subdistricts and work under the direction of the District Inspectors.

SEED AND FEED TESTING DIVISION

During the year April 1, 1920, to March 31, 1921, the number of samples tested at each of the laboratories maintained at Ottawa, Winnipeg and Calgary was as follows:—

	Ottawa	Winnipeg	Calgary
Feeding stuffs	350	.....	.....
Trade	13,116	4,525	7,640
Customs	3,164	1,951	1,749
Official.. .. .	441	80	180
Investigation	300	104	482
Feeding stuffs.. .. .	350	.....	.....
Total	17,371	6,660	10,051

Owing to the difficulties of filling the vacancies caused by the resignations during the past year, the efficiency of the laboratories was to some extent impaired, particularly at Winnipeg and Calgary, both of which were without any officer in charge for some months. These vacancies have, however, now been filled. Good crop conditions in the west last year resulted in the testing being somewhat lighter at the western laboratories. At the Ottawa Laboratory, however, the congestion has been unusually great during the closing months of the year.

NATURE OF TESTS

Samples received are listed as Trade, Customs, Official and Investigation, according to source and the object for which information is desired.

Trade samples are those received from merchants, farmers and institutions.

Customs samples are sent by Customs Officials in connection with the Importation Order in Council.

Official samples are those taken by seed inspectors from lots of seed suspected of being sold in violation of the Seed Control Act. Prosecutions are based on the results of the analysis of official samples.

INVESTIGATION

Each year much investigation work is done which involves thousands of tests which are not listed in our reports. The investigation of the effect of frost on the

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vitality of western cereals is being continued as have also the long continued experiments on the longevity of common and vegetable seeds. Experiments with standard samples supplied by the International Conference on Seed Testing have also been undertaken.

SEED EDUCATIONAL WORK

Standard collections of weed and economic seeds have been supplied to firms and educational institutions desiring same at cost price. The demand has been so great as to make it impossible to supply all requests. Bulletin S. 8 on the "Weeds and Weed Seeds of Canada" has again been revised and enlarged in order to meet the ever-unceasing demand for this useful publication.

MICRO-ANALYSIS OF FEEDING STUFFS

Including cereal products, oil meals, and medicated feeds, approximately one hundred and fifty samples of ground feeding stuffs have been examined in the Seed Branch during the past year. For the most part these were received direct from farmers and feeders accompanied by statements to the effect that feeding had resulted in serious or even fatal consequences to stock. A few analyses were made for manufacturers also, and in several cases institutions not in a position to make the requisite examination have forwarded samples from their correspondents. The cereal product feeds comprised dried brewers grains, malt sprouts, bran, shorts, gluten feeds and various chops, while the oil cakes included both linseed and cottonseed meals. Other feeds consisted of various combinations of these materials with or without one or more additional ingredients, such as packing house by-products, pea or bean meal, charcoal grit, etc. Certain tonics, relishes or condiments added to a more or less nutritive combination of ingredients formed the medicated feeds. Several samples in this diversified group were unnamed, others bore brand or trade names and others again were specifically designated to indicate the particular type of stock for which they were presumably best suited.

The weed seeds found in these feeds have been divided into three classes: poisonous, objectionable and non-injurious. To the first class belong the cockles and wild, tumbling and wormseed mustards, etc., which have been proven to possess toxic properties and are considered injurious in feeding stuffs. One or two representatives of this class occurred in sixty per cent of the feeds, not only in the ground form but also as whole seed. In one instance there were as many as 792 vital seeds per ounce of the one variety in a single feed.

The second group consists of seeds considered objectionable, for various reasons, as ingredients of feeding stuffs. Where a kind is suspected of toxicity, is unpalatable or possesses structural characteristics presenting mechanical difficulties in the way of digestion, it has been relegated to this class. Hare's ear, brown and ball mustard, stinkweed and stickseed all appear for one reason or another to have objectionable properties. Although none of these have as yet been definitely shown as poisonous every evidence thus far indicates that they are likely ultimately to be proven of a harmful nature. Incidentally it is noteworthy that in the feeds examined, a number suspected of containing substances unpalatable or even injurious to stock were found to be free from any harmful adulterant, other than seeds of this group.

These objectionable sorts appeared in fifty-four per cent of the feeds examined. A single sample might possess from one to five different kinds of seeds, including both whole and ground conditions. The maximum number of vital objectionable seeds per ounce in any one sample was 356.

To the third class of seeds belong such forms as wild buckwheat and wild oats, on the one hand, and lamb's quarters and lady's thumb on the other. The first type of seed while possessed of considerable hull is yet fairly easily capable of pulverization and possesses some nutritive value than can be made available to certain classes of

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stock at least. In the second type, however, a particularly resistant seed coat makes satisfactory grinding almost impracticable and renders the seed highly indigestible and thus of negligible feeding value. The presence and relative abundance therefore of such seeds in a feeding stuff necessarily affects its worth. From one to nine different kinds of seeds of this sort per ounce sample occurred in ninety per cent of the entire collection of feeds. One feed contained as many as 2,962 vital seeds per ounce.

Considering whole seeds in general a further observation is to be made, namely that thirty-seven per cent of those which occurred in these feeds were noxious within the meaning of the Seed Control Act. Again, from the point of view of possible injury to stock consequent upon ingestion, ninety-eight per cent of these noxious forms must be considered deleterious.

In a considerable number of feeds the poisonous fungus ergot was also found.

In view of the selling price of feeding stuffs it is often surprising to learn the nature of their constituents. A "barley meal," for instance, selling at \$4.05 per cwt. contained no barley. It was composed of a mixture of finely ground corn, sorghum, bean meal, and pulverized oat hulls. In general appearance the sample was not unlike a ground barley, the mealy portion resembling the flour and the fibrous portion the hulls. Microscopical examination, however, proved the true character of this so-called "barley meal." A sample of "feed flour" priced at \$4.50 per cwt. was likewise discovered as another evidence of fraudulent practice. Superficially it resembled a poor grade feed flour containing a considerable proportion of bran. The flour, however, proved to be a mixture of ground corn, sorghum and bean meal while the bran consisted of ground rice hulls. In addition to a certain amount of shorts, a sample designated as such, contained ground rice hulls, sorghum and corn with a trace of ground oil cake and pulverized oat hulls. A "stock feed" suspected from effects of feeding to contain poisonous ingredients, was found to be composed of a mixture of ground peanut skins, corn, bran and oat hulls. This is an obviously highly indigestible and non-nutritious combination, by reason of its physical character quite capable of disturbing ordinary digestive processes and thus of causing symptoms easily to be mistaken for those of poisoning.

A few samples of screenings were also examined for injurious weed seed content. It was found that sixty-five per cent contained more than the margin of tolerance allowed by the Feeding Stuffs Act and thus would have to be recleaned before being chopped or crushed for selling as feed.

WHEAT PRODUCTS STANDARDS

The examination of numerous samples of shorts during feeding stuffs investigations showed considerable variations in the character of that product. With the intention of ascertaining something of the nature and extent of this variation a collection of samples was made and submitted to comparative examination. Although found possible to form an intergrading series ranging from the feed flour to the bran-like type it was observed that the greater proportion of the samples, especially those from the larger mills, had come more or less to resemble fine bran. The necessity for a revision of standards in respect to wheat product feeds therefore became apparent.

FEED EDUCATIONAL WORK

The microscopical findings resulting from an investigation of some four hundred representative samples of Canadian feeding stuffs completed last summer, have been compiled for presentation in bulletin form. Physical composition has been outlined, poisonous properties of weed seeds discussed and other adulterants noted. A comparison of these observations with the chemical data determined for the same set of feeds by the Experimental Farms Branch will, it is expected, emphasize the necessity for a

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knowledge of feeding stuffs from the standpoint of actual physical content. It is becoming more and more apparent that although essential, it is not sufficient to ascertain chemical composition alone. The quality of protein as determined by a knowledge of constituents is gradually being recognized to have a definite bearing on feed value. Balanced rations accurately compounded on the basis of quantity without regard to quality have in many instances been found to prove unsatisfactory, while the same chemical balance compounded by use of other feeds will produce desired results. The explanation while not always dependent on the quality of protein can often be traced to no other cause. A bulletin containing the results of this work both from the botanical and chemical standpoints will shortly be ready for publication.

SEED INSPECTION DIVISION

The office work performed by this division last year comprised the grading according to the standards set forth in the Seed Control Act and issuing certificates and mailing reports for all samples received at the seed laboratories for testing purposes, including samples from the seed trade, farmers, inspectors' official samples, and samples from the collectors of customs. The samples from the Customs officials represented seven and a half million pounds of seed imported. Other activities include the inspection and grading of seed oats entered in combined field crop and cleaned seed competitions, making seed crop and seed supply surveys, judging at seed fairs and giving public addresses on the Seed Control Act and its administration.

INSPECTION OF THE SEED TRADE

The field inspectors visited 7,725 dealers throughout the various provinces and discovered 783 violations of the Act, most of which were of a minor nature. Whenever suspected violations are found the inspectors take official samples and forward them to the nearest Dominion Seed Laboratory with a report covering the case. After the sample is received and analysed the official certificate of analysis is forwarded to the party concerned together with a letter asking for an explanation as to why this seed was offered for sale contrary to the Act. Where unsatisfactory explanations are given or where inspectors find on second visits that the provisions of the Act are still being ignored then these cases are recommended for prosecution. Last year thirty-six prosecutions were successfully conducted.

ELEVATED INSPECTION

The inspection of seed grain at the Canadian Government interior terminal elevators is made available to any shippers who desire to make use of it but it has been taken advantage of principally by the Seed Purchasing Commission. Again this season seed inspectors have been maintained at the Government elevators at Calgary, Moosejaw and Saskatoon. Grain passing through these elevators was inspected and if found suitable for seed it was separately binned in seed bins and certificates issued which are attached to the warehouse receipt and forwarded to the shippers. When seed grain is ordered out of these elevators it is cleaned to the seed standards and shipped either in bulk or sacked and each shipment is covered by an Ex elevator Seed Certificate giving the seed grade. Reduced seed grain rates are allowed by the railways to the Seed Purchasing Commission only on shipments accompanied by these certificates.

The quantities of seed grain for which outgoing inspection was made and seed certificates issued last season were as follows: seed wheat, 702,712 bushels, seed oats, 1,105,945 bushels; seed barley, 16,353 bushels.

Service was also given in the inspection and grading of timothy seed received at the Calgary elevator. Provision is made at this elevator for the cleaning and

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handling of timothy seed in the same manner as for the cereal grains. The growers consign their seed to the elevator in an uncleaned state from the thresher and as it is received it is cleaned, graded and binned according to grade and each shipper receives a warehouse receipt for his seed giving the gross weight and the net weight and grade of recleaned seed. The amount of 1920 timothy seed inspected was 516,369 pounds.

FIBRE FLAXSEED INSPECTION

The inspection of fibre flaxseed for export was continued again last year with the object of maintaining the reputation of Canadian-grown fibre flaxseed in the Irish market. The Ontario and Quebec flax growers notified the Seed Branch when shipments were cleaned, bagged and ready for shipment and an inspector was then provided who made the inspection, and if up to the seed standards, labelled and sealed the bags. Certificates were issued for only No. 1 fibre flaxseed which has a high purity and germination standard. The seed certificates were issued in duplicate, one for the grower and the other to be forwarded to the purchaser. Our method of inspection and the quality of seed received in Ireland received favourable comment from the Irish Department of Agriculture. There were 48,000 bushels of No. 1 seed of fibre flax inspected last season by this Branch.

SEED MARKETS DIVISION

This division compiles and issues seed crop and markets reports, renders assistance in seed marketing, and supervises the administration of subventions paid through the Seed Branch to the Provinces to encourage field crop competitions, seed fairs and exhibitions.

SEED CROP AND MARKETS REPORTING

Seed crop reports were issued during the production season and semi-monthly market circulars were compiled and issued during the marketing season of clover and grass seeds. These were mailed only to those who indicated that they were especially interested by supplying information from time to time. The farm press also co-operated by publishing the reports promptly.

The market reports covered the more important markets of Canada, Great Britain and the United States and included current market values of seeds, both to the grower and to the wholesaler. The Canadian Government Trade Commissioner, London, England, and the Bureau of Markets, Washington, D.C., supplied the information relative to seed prices, supply and demand in Great Britain and the United States respectively. Information bearing on domestic market conditions was secured from Canadian seed dealers, farmers' organizations and farmers, while the Agricultural Branch of the Dominion Bureau of Statistics gave valuable service in this respect.

Special educational circulars, covering the availability and reliability of commercial seed supply of Canadian production were issued, and are believed to have been an important factor in the distribution of the following supplies: Certified seed potatoes of Prince Edward Island, Nova Scotia, New Brunswick, Quebec and Ontario; swede turnip seed of the Maritime Provinces; field root and garden vegetable seeds of British Columbia; seed corn of Ontario; and registered seed of the Canadian Seed Growers' Association.

SEED MARKETS EXTENSION

Suggestions were offered and directions given to growers who desired to improve their organization for marketing. Certified seed potato growers of Quebec appointed

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the Central Farmers' Co-operative Association, Montreal, their marketing agents. The alsike growers of Ontario marketed their seed through the United Farmers' Co-operative Company, Toronto. The Western Ontario Corn Growers organized a Co-operative Seed Corn Marketing Association.

Standard fibre flax seed export sacks were purchased in wholesale quantity and supplied to exporters at cost; 16,700 sacks were ordered and delivered to the growers.

SEED PRODUCTION

Subventions were paid to Provincial Departments of Agriculture to promote field crop competitions, local seed fairs and provincial seed exhibitions. The total amount of moneys paid was \$36,548.37. The amounts paid to each province approximated one-half the total cost of conducting these services. They have been the means of encouraging the more general use of good seed in Canada and have indirectly created seed supplies for commerce.

FIELD CROP COMPETITIONS

Subventions were paid for field crop competitions in 1920 as follows:—

	Number	Subvention paid.
Prince Edward Island	12	\$446.04
Nova Scotia	8	332.93
New Brunswick	18	1,106.00
Quebec	143	5,950.00
Ontario	305	13,789.73
Manitoba	55	1,813.12
Saskatchewan	71	2,181.46
Alberta		
British Columbia		
Total	612	\$25,619.28

LOCAL SEED FAIRS

The subventions paid on account of local seed fairs in 1920 were as follows:—

	Number	Subvention paid
Prince Edward Island .. .. .	.....	.....
Nova Scotia	5	\$ 265.00
New Brunswick	7	407.97
Quebec	74	3,438.99
Ontario	10	262.36
Manitoba	46	1,933.54
Saskatchewan	15	903.67
Alberta	22	873.96
British Columbia .. .. .	.....	.....
Total	179	\$8,085.49

PROVINCIAL SEED EXHIBITIONS

The following subventions were paid on account of provincial seed exhibitions in 1920:—

	Place of Exhibition	Subvention paid.
Nova Scotia	Truro	\$332.93
New Brunswick	Fredericton	268.33
Quebec	Quebec	600.00
Ontario	Guelph	651.34
	Ottawa	348.00
Manitoba	Winnipeg	600.00
Saskatchewan	Saskatoon	343.00
		\$2,843.60

Alberta did not hold a provincial seed exhibition in 1920.

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By special arrangement the subvention available to British Columbia on account of field crop competitions and seed exhibitions was devoted to encouraging the production of field root and garden vegetable seeds, which, because of climatic conditions, may be grown to better advantage there than elsewhere in Canada. The expenditure for this purpose was \$2,500, an equal amount being contributed by the Provincial Department of Agriculture.

ASSISTANCE TO CANADIAN SEED GROWERS' ASSOCIATION

Financial support of the work of the Canadian Seed Growers' Association was continued during the year 1920 to the extent of \$7,500 from the Seed Branch appropriation. The last annual report of the Association shows 2,702 members and other growers engaged in the production of registered and improved seeds.

SEED PURCHASING COMMISSION

The Seed Purchasing Commission operating under this branch has rendered valuable service to the farmers of the provinces of Alberta and Saskatchewan who suffered partial crop failure because of climatic conditions. This Commission, throughout the grain shipping season, purchases supplies of seed of wheat, oats and barley that will conform to the established grades for seed under the provisions of the Seed Control Act. All of the seed grain is purchased subject to seed inspection and the delivery of seed inspection certificates, together with the warehouse receipts for the car lots of seed grain that have been received and separately binned in the Canadian Government terminal elevators at Calgary, Moosejaw and Saskatoon. The seed grain is purchased in an uncleaned condition but is thoroughly cleaned for seed purposes before it is shipped from the elevator, and the Commission is required to deliver a Seed Inspector's certificate for all of the seed grain sold.

The charges for the recleaned seed grain have been made just sufficient to cover the average purchasing price of the grain; the elevator charges for elevating, storing and cleaning; the net wastage in cleaning; the cost of sacks and sacking when required by the purchaser; and the cost of transportation; to which is added a small margin sufficient to meet incidental losses to cover the operating expenses of the commission, and a fair rate of interest on the moneys advanced to the commission by the Dominion Government. As all sales are made subject to cash payment, the commission has been able to make prompt returns to the Receiver General.

Last year the commission filled requisitions received from provincial and municipal bodies, farmers' organizations and individual farmers, for more than a million bushels of seed oats and lesser quantities of seed wheat and seed barley. The commission has been able to supply the demand for seed grain from any part of Canada although the need for its services has arisen mainly in the three Prairie Provinces. It is satisfactory to be able to report that this valuable service to agriculture has been continued without financial loss to the Government, even for the expenses of the trained staff employed in this work.

In consideration of the wide expanse of the agricultural country in Canada lying between the Great Lakes and the Pacific slope, its geographical position being inland and extending far to the north, it would seem to be reasonable to expect that in most years some locations within this wide area may suffer crop failure to the extent of needing well organized assistance in procuring seed supplies from other provinces or districts. Such at least has been the experience in many, if not, most years. The 1920 crop in parts of southwest Saskatchewan suffered substantially from excessive heat and drought. The wheat crop in some districts was materially reduced in yield but the oat crop, under such conditions, was almost destroyed. In consequence, and at the urgent request of the interested public, recommendations were made to Council for the continuance of the services of the Seed Purchasing Commission.

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Because of the area affected being not large as compared with former years, and of the fact that there is an abundant supply of good seed in the neighbouring provinces, the operations of the commission are not on so large a scale as in former years. The commission, however, is in a position this year, from the bountiful supply of superior quality seed oats in the province of Alberta, to procure and hold a reserve supply until such time as there is evidence of a plentiful supply of seed oats from the crop of 1921. The unfortunate experience of some past years would indicate the wisdom of this action on the part of the commission as a measure of insurance against possible seed shortage.

FEED DIVISION

The Feeding Stuffs Act, assented to July 1, 1920, came into operation on January 1, 1921, by proclamation issued by the Governor in Council and published in the *Canada Gazette*, December 4, 1920. This Act is designed to regulate the sale and inspection of commercial feeding stuffs, bran, shorts, middlings, and chop feeds, and was enacted as a result of an increasing demand for more efficient control of feeding stuffs, especially in reference to their content of vital and deleterious weed seeds.

As provided for under the Act, an Advisory Board, representative of the various interests concerned, has been appointed, the duty of which is to recommend such regulations as it is of opinion should be established under the Act. This Advisory Board met in conference at Ottawa on August 10, 1920, and recommended certain regulations which have been adopted. A bulletin being a reprint of the Feeding Stuffs Act and the regulations thereunder has been prepared and widely distributed.

Under the provisions of this Act every commercial feeding stuff imported into or offered for sale in Canada must be registered with the department and have assigned thereto a registration number. By May 1, 462 such products had been registered.

Former feeding stuffs regulations provided for inspection at points of distribution and sale and were based largely on the chemical contents of ground feeding stuffs. The new Feeding Stuffs Act provides also for inspection at points of manufacture and is based on both chemical and physical properties. Services in connection with chemical analyses of feeding stuffs are being provided by the Chief Analyst of the Department of Health.

STANDARD SET FOR RECLEANED SCREENINGS

Upon the recommendation of the Advisory Board under the Feeding Stuffs Act a standard of quality for recleaned screenings has been established and made effective by agreement as between this department and the owners of elevator screenings. Purchasers may now obtain "Standard Recleaned Screenings," of comparatively uniform quality and feeding value and which do not contain in excess of 3 per cent of chaff and dust and 3 per cent of any or all kinds and varieties of mustards or other small weed seeds. A grain inspector's certificate to this effect is furnished upon request, with each shipment.

REVISED STANDARDS FOR MILL PRODUCTS

A remarkable variability was observed in the quality of wheat bran, shorts and middlings as placed on the market by different manufacturers. The live stock interests represented on the Advisory Board under the Feeding Stuffs Act and representatives of the Canadian National Millers' Association were therefore brought into conference for the purpose of agreeing upon revised standards for these mill products. The practice of many manufacturers during recent years has been to mix with these products the "mill-run" of screenings, which practice, as indicated by the numerous complaints submitted to the department has proven very unsatisfactory to live stock

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feeders and particularly to hog raisers. As a result of these negotiations the Canadian National Millers Association, which represents a very large percentage of the total milling capacity of Canada, has agreed to encourage its members to produce for the market pure wheat bran and pure middlings and to include the "mill-run" of screenings with their shorts only. Mr. E. S. Archibald, Director of Experimental Farms and Dr. F. T. Shutt, Dominion Chemist, have been selected by the live stock organizations to represent their interests in the matter of deciding upon standards to be adopted for each of wheat bran, shorts and middlings, and when finally decided upon these standards will be made effective by regulations under the Feeding Stuffs Act.

PROGRESS

During these first three months that the Feeding Stuffs Act has been in force, efforts have been directed largely towards educating manufacturers in respect of the requirements of the law. This propaganda has been conducted through the medium of our inspection service, through the agricultural press and by means of circular news letters issued periodically. Thus far, no prosecutions have been made, any offender having been let off with a warning. Less tolerance will be shown those in default once the provisions of the Act are thoroughly understood. It is pleasing to report that, on the whole, manufacturers have shown a disposition to comply with the provisions of the Act and many live stock feeders and organizations have approved it as timely and suitable legislation.

ENTOMOLOGICAL BRANCH

The Dominion Entomologist has estimated that the yearly loss in Canada to field, orchard and garden crops, due to destructive insects amounts to the enormous sum of \$200,000,000. To this huge devastation must be added the annual destruction caused by forest insects, stored product insects, etc. The officers of the Entomological Branch have during the year materially assisted farmers, fruit growers, gardeners, etc., in efforts to protect their crops from the ravages of injurious insects and it has been estimated that entomological investigations in Canada have in 1920 resulted in the saving of many millions of dollars worth of crops. As in the past, biological studies have been made of important farm and garden insects, stored product insects, etc. Excellent progress has also been made in studies on the natural control of insects, and new insecticides have been developed which are resulting in important savings to farmers and orchardists. In the various provinces where entomological field laboratories have been established, advice regarding the control of insects is being constantly sought by the residents. Extensive demonstrations of insect control under field conditions were made in several of the provinces.

Under the direction of the Dominion Entomologist the Regulations under the Destructive Insect and Pest Act have been administered in so far as these refer to insect pests. The following amendments to the regulations referring to insects were passed during the year:—

By Order in Council dated April 14, 1920, the importation into Canada of alfalfa (lucerne) hay, whether for feeding, packing or other purposes, originating in the states of Idaho, Utah, and also in the counties of Uintah, Sweetwater and Lincoln in the state of Wyoming and the counties of Dennison and Gunnison in the state of Colorado; four of the United States of America, is prohibited.

This amendment was passed in order to prevent the introduction of the alfalfa weevil into Canada on shipments of alfalfa hay.

By Order in Council dated May 24, 1920, the amendment dealing with the European corn borer passed on May 19, 1919, was rescinded. Under the new amend-

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ment the importation into Canada of corn and broom corn, including all parts of the stalk, celery, green beans in the pod, beets with tops, spinach, rhubarb, oat and rye straw, as such or when used as packing, cut flowers or entire plants of chrysanthemums, aster, cosmos, zinnia, hollyhock, gladiolus and dahlia from the areas in the United States infested by the European corn borer is prohibited, unless the same are accompanied by a certificate of inspection issued by the United States Department of Agriculture stating that the above products are free from the pest.

By Order in Council dated August 21, 1920, the amendment dealing with the apple sucker passed on November 28, 1919, was rescinded and substituted by a Ministerial Order. Under this Ministerial Order the counties of Kings, Hants, Colchester and Cumberland, in the province of Nova Scotia were quarantined on account of the apple sucker, and no nursery stock may be moved from any of the quarantined areas unless accompanied by a permit or a certificate of inspection duly signed by an authorized inspector.

By a Ministerial Order passed on September 16, 1920, the removal of corn, including all parts of the plant, from the London, Ont., fair grounds was prohibited on account of the danger of spreading the European corn borer thereby.

On September 25, 1920, a Ministerial Order was passed adding the communities of Aldersville, New Ross and Mill Road, in the county of Lunenburg, Nova Scotia, to the areas mentioned in the Quarantine passed on August 21, 1920, under which the removal of nursery stock is prohibited owing to the danger of spreading the apple sucker.

On November 25, 1920 a Ministerial Order was passed prohibiting the removal of corn fodder or cornstalks, including broom corn, whether used for packing or other purposes, green sweet corn, roasting ears, corn on the cob or corn cobs, from the areas in southern Ontario infested by the European corn borer. Five exceptions were made to this quarantine, namely:—

1. To the articles enumerated when they shall have been manufactured in such a manner as to eliminate the risk of carriage of the European corn borer.

2. To clean shelled corn and cleaned seed of broom corn.

3. To shipments of the articles enumerated, transported through the quarantined areas on a through bill of lading.

4. To shipments of the articles enumerated for experimental or scientific purposes, by the Dominion Department of Agriculture or the Ontario Department of Agriculture.

5. To shipments of dried seed corn on the cob for exhibition purposes and consigned to the secretary of a winter fair or exhibition duly recognized by the Dominion Department of Agriculture or the Ontario Department of Agriculture. Such shipments shall be inspected at point of destination by an inspector duly appointed under the Destructive Insect and Pest Act.

By Order in Council dated February 25, 1921, that part of section 3 of the Regulations under the Destructive Insect and Pest Act passed on July 17, 1917, and reading as follows, was rescinded:—

“Truro, N.S., and Digby, N.S., for nursery stock destined to points in the province of Nova Scotia only, from March 15 to May 15, and from October 7 to December 7.”

DIVISION OF FIELD CROP AND GARDEN INSECTS

During the year the European corn borer was found for the first time in Canada, in the latter part of August. In that month and in September this dreaded pest was found in fields of corn in several counties in the province of Ontario. Investigations were immediately undertaken, biological as well as control, so far as this was possible

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owing to the lateness of the season. A leaflet describing the insect and its economic importance was given wide distribution, in addition to which large numbers of farmers were visited and the danger of the infestation described. Life-history and control studies were also made during the year, on such pests as cutworms of various kinds, grasshoppers, white grubs, root maggots and other field crop and garden insects. The adoption by commercial growers of the corrosive sublimate treatment for protecting cabbages and cauliflowers from the ravages of the cabbage root maggot, in 1920 in Ontario alone resulted in the saving of crops to the value of many thousands of dollars.

Throughout the various provinces officers of the branch have kept in close touch with outbreaks of injurious insects and have given prompt advice regarding control measures. This service is every year becoming more appreciated by farmers generally.

In addition to insects affecting field crops and garden crops, special investigations have been made on insects which attack greenhouse plants, preparatory to the publication of an illustrated bulletin on the subject.

DIVISION OF FOREST INSECTS

The work of this division has included bark-beetle investigations in British Columbia, spruce budworm investigations in New Brunswick, Quebec and Ontario, permanent forest sample plot studies in Eastern Canada, and shade tree insect investigations.

Bark beetle studies are necessary in order to extend and improve our methods of control. These latter are being conducted on an extensive scale in co-operation with the Dominion and Provincial Forestry Branches.

The spruce budworm investigations have included a thorough survey of the injured districts in New Brunswick and an examination of the Temiskaming district in northern Ontario, where a fresh outbreak was discovered which is spreading westward. Through the co-operation of the Air Board a successful air machine survey was made by our officers in their study of this latter infestation.

The forest sample plot studies have developed further during the year. Thirty-eight permanent plots have now been established with the trees thereon described and under observation. They are located in New Brunswick, Quebec and northern Ontario.

Investigations on shade tree borers have been conducted chiefly at the forest insect laboratory at Aylmer, Que. Satisfactory results are being obtained.

DIVISION OF FOREIGN, PESTS SUPPRESSION

This division has charge of the carrying out of the regulations of the Destructive Insect and Pest Act in so far as insect pests are concerned.

During the year the brown-tail moth suppression work was continued in the provinces of Nova Scotia and New Brunswick. During the period December 6, 1920, to March 26, 1921, the total number of nests found by our inspectors in the former province was 530. In the province of New Brunswick no nests were found.

In the early part of the summer further scouting was effected in Nova Scotia to define the existing area infested by the apple sucker recently discovered in that province. As a result the Order in Council above referred to was passed.

Two important destructive insects were discovered for the first time in Canada in 1920, namely, the European corn borer and the satin moth, also of European origin. The first-mentioned insect is one of the worst known pests of corn and immediately on its discovery in Ontario, in the latter part of the month of August, every effort was made to define the infestation and to give all possible advice to farmers in the

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affected districts. A leaflet was distributed widely and other methods of education adopted. The scouting work was continued until October 23. Thirteen counties in southern Ontario were inspected and seven of these were found to be infested by the corn borer.

The satin moth was discovered by officers of the branch in the vicinity of New Westminster, B.C. in July, 1920.

During the year the inspection and fumigation of nursery stock entering Canada has been continued.

DIVISION OF SYSTEMATIC ENTOMOLOGY

Important additions have been made to the National Collection of Insects during the year. The valuable collection belonging to the late F. H. Wolley-Dod, of Midnapore, Alta., which was bequeathed to the branch, was received safely and has since been incorporated in the main collection. The national collection on the whole has been materially enriched by the collections and studies made by the officer in charge of the division assisted by other officers of the branch.

Systematic revisions have been made of various important groups which have been of great assistance not only to our own officers but to students of entomology generally.

An important beginning has been made in the establishment of a permanent collection of those forms of insect life which require preservation in alcohol and other liquids.

The officer in charge of the national collection has continued to identify specimens for economic workers, teachers and others interested in insect life.

INSECTICIDE INVESTIGATIONS

These investigations have been conducted mainly in the province of Nova Scotia and with the object of further developing promising dusts for apples and potatoes. An important finding was that which demonstrated the extent to which white arsenic may be substituted for the more expensive insecticides. This will result in an enormous saving to the fruit grower and farmer. New insecticides developed by our officers are tested widely under orchard and field conditions.

NATURAL CONTROL INVESTIGATIONS

The work of the officers employed on natural control investigations has been directed chiefly to studies of the natural control of the spruce budworm, forest tent caterpillar, green apple bug and other pests. Much progress has been made in these studies during the year. A full report on the fall webworm resulting from eight years of study has been completed and it is expected will soon be published.

STORED PRODUCT INSECT INVESTIGATIONS

In view of the important losses which take place every year to stored grain and other products, an officer of the Entomological Branch has been placed in immediate charge of such investigations. During the year a number of elevators, mills and warehouses have been visited and preliminary studies made of important pests, such as the various kinds of mites, grain beetles, etc.

MOSQUITO INVESTIGATIONS

The mosquito investigations incepted in the Fraser River Valley of British Columbia in 1919 were continued during 1920 by the special assistant appointed for this work. Surveys of the chief breeding places of mosquitoes were made chiefly by motor boat and much valuable data secured regarding the life-histories of these insects.

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INDIAN ORCHARD WORK

Under the direction of the Dominion Entomologist an officer of the Department of Indian Affairs has during the year visited various Indian settlements in British Columbia for the purpose of advising them in general on matters relating to crop protection etc. This work has proved of much value.

FIELD LABORATORIES

Annapolis Royal, N.S.—In addition to insecticide investigations which are carried on at this laboratory, studies have also been made of important outbreaks of insects occurring in Nova Scotia. The rather widespread outbreak of the true army worm was investigated, resulting in an opportunity of demonstrating under field conditions successful control by means of poisoned bait. Many demonstrations of insect control were conducted by the officer in charge of this laboratory, not only in Nova Scotia, but in New Brunswick as well.

Fredericton, N.B.—This laboratory, which is the headquarters for natural control studies has in addition investigated outbreaks of important pests, such as tent caterpillars, birch leaf skeletonizer, spruce budworm, fall webworm, army worm, etc. The work of recovering parasites of the brown-tail moth, introduced from Massachusetts into the Maritime Provinces was continued.

Hemmingford, Que.—Orchard demonstrations with various sprays and dusts occupied a good deal of the time of the officer in charge of this laboratory during the year. These demonstrations are being followed closely by fruit growers of the district. The following are some of the insects which were most destructive in Quebec province: Flea beetles, fruit worms, cutworms, root maggots, white grubs and budmoth.

Vineland Station, Ont.—The entomologist in charge of this laboratory continued investigations on the biology and control of the pear psylla, potato leaf-hopper, strawberry weevil, blackberry leaf-miner, etc. Orchard demonstrations in the control of a number of fruit pests were conducted in various sections of the Niagara district. Experiments with orchard dusts and new spray materials were also undertaken.

Strathroy, Ont.—The major investigations conducted at this laboratory related to the hessian fly, which has been destructive to wheat in western Ontario; white grubs which are important soil infesting insects; potato beetle, and cornborer. In the early part of the season the seed corn maggot caused serious losses in certain sections.

Treasury, Man.—The continued outbreak of grasshoppers in Manitoba in 1920 necessitated the personal attention of the entomologist in charge of this laboratory during most of the season. In May, June, July and August meetings of farmers in infested districts were addressed, bait-mixing stations visited and advice in general given. Over 4,000 miles were covered by motor car. The western wheat-stem sawfly was again seriously destructive. Other pests such as cutworms, diamond back-moth, blister beetles, etc. were also present in destructive numbers.

Saskatoon, Sask.—The officer in charge of this laboratory, in addition to assisting in the grasshopper campaign, continued investigations on the biology of such pests as black flies, horse flies, etc. Outbreaks of cutworms were also studied, as well as infestations of the best webworm which was prevalent in the province.

Lethbridge, Alta.—Field experiments in cutworm control were conducted by the entomologist in charge of this laboratory. Studies of the parasites of these insects were also made. In Alberta, as well as the other Prairie provinces, grasshoppers were very abundant particularly in southern portions of the province. From the end

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of May until late in the season, the services of our resident field officer were required in the campaign of control. This work resulted in the saving of much crop from destruction.

Vernon, B.C., Agassiz, B.C., Victoria, B.C.—The officer in charge of the Vernon laboratory has had general supervision over all entomological work in British Columbia. During the year important investigations were conducted on the life-history and control of orchard and small fruit insects, such as codling moth and insects frequently mistaken therefor, strawberry-root weevil, currant fruit fly, etc., as well as on vegetable insects, particularly the cabbage root maggot and the onion maggot. Insects affecting range lands, especially grasshoppers, also required attention. The caterpillars of the satin moth, a destructive European pest were found for the first time in Canada in the province. An infestation of the hessian fly was also investigated.

PUBLICATIONS

The following publications have been issued from the Entomological Branch during the year:—

Crop Protection Leaflets:

No. 13.—The European Corn Borer. By Arthur Gibson and L. S. McLaine.

No. 14.—The Control of Grasshoppers. By Norman Criddle and A. V. Mitchener.

Entomological Circulars:

No. 13.—Locust Control in the Prairie Provinces. By Norman Criddle.

No. 14.—(Technical) Boring Caterpillars affecting Corn and other Crops and which are liable to be mistaken for the European Corn Borer. By Arthur Gibson.

Entomological Bulletins:

No. 18.—Studies in North American Cleorini (Geometridæ). By J. McDunnough.

In addition to the above departmental publications the officers of the Entomological Branch have contributed articles in *The Agricultural Gazette of Canada* as well as in technical journals, such as *The Canadian Entomologist*, transactions of various societies, etc. Many articles prepared for the agricultural press have also been published.

NEW DOMINION ENTOMOLOGIST

Mr. Arthur Gibson, Senior Divisional Chief of the Entomological Branch, was promoted to the position of Dominion Entomologist, made vacant by the death of Doctor C. Gordon Hewitt.

FRUIT BRANCH

THE FRUIT SEASON

It is many years since weather conditions were more favourable to fruit growing than during the past season. There was an abundance of bloom which, with exceptionally favourable weather, resulted in a heavy set of fruit. The apple crop, although approximately a quarter of a million barrels less than that of the previous year, was considered very satisfactory in view of the heavy crops produced in British Columbia and Nova Scotia in 1919, and the great loss of trees in Ontario and Quebec resulting from the severe weather during the winter of 1917-18. In Ontario, where a great many of the orchards were neglected during the war years, the crop was double that of the previous year and the quality of the fruit was much better than average. In

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British Columbia, where large acreages were planted several years ago, the later plantings came into commercial bearing last year and, with favourable growing conditions, it was expected that the tonnage would be equal to the previous year. Unfortunately weather conditions in many parts of the province were not favourable, with the result that the apple crop was not more than 55 per cent of that of 1919. With the present showing of fruit buds and the healthy condition of the trees, this province promises to produce in 1921 the biggest crop in its history. Notwithstanding the heavy crop produced in Nova Scotia in 1919, which was approximately 1,800,000 barrels, the past season's crop exceeded one million barrels of a quality above average. The trees have come through the past winter in excellent condition and there is another good showing of fruit buds. In the provinces of New Brunswick and Prince Edward Island the crop was less than the previous year. Quebec produced a crop approximately 50 per cent of normal, which was a considerable increase over the previous year.

With the removal of price control of apples in the United Kingdom and many causes for discouragement arising out of war conditions, fruit growers throughout Canada are now giving greater attention to their orchards than at any time in the history of the industry. Another very encouraging sign is the serious attention which has been given to fruit marketing and distribution especially in the Provinces of Ontario and Quebec, where the establishment of marketing facilities have been very much neglected.

As regards tender and small fruits, in some provinces these crops were not as large as was expected from the showing of blossoms, due to late frosts in some districts, and in others to unusually dry warm weather when the fruit was nearing maturity. In British Columbia, especially on Vancouver island and the lower mainland, notwithstanding the increase in acreage, the strawberry crop fell far short of the previous year. Much greater care, however, was exercised in the marketing of the berry crops, with the result that good prices were received. Berries of all kinds were shipped to the Prairie Provinces without loss. In the Niagara peninsula, notwithstanding the severe winter of 1920, fruit trees of all kinds entered the growing season in an unusually healthy and promising condition. It is doubtful if this district has in any previous season shown such a uniform and profuse bloom. The continued favourable weather during the blossom period resulted in a heavy set of all kinds of fruit. Somewhat similar conditions obtained in other parts of the province. The strawberry crop in Quebec where plants were unprotected during the winter, was almost a complete failure.

CROP AND MARKET REPORTS

The Fruit and Vegetable Crop Report was issued monthly from June to October, inclusive. It gave in concise form crop prospects and conditions in all parts of Canada, compiled from reports made by our staff of fruit inspectors and from reports supplied by growers in all parts of the country. It also included an estimate of the prospects in countries whose produce competes with Canadian-grown fruit and vegetables. In addition these reports serve a useful purpose in bringing to growers' and shippers' attention other items of general interest, such as new regulations with respect to fruit grading and packing, packages, tariff changes and other transportation matters affecting the fruit and vegetable industry.

The Telegraphic Market Report, which has been issued during the fruit marketing season since 1914, has been continued and was issued simultaneously at Middleton, N.S., Ottawa, Winnipeg and Vancouver twice weekly during the period of heavy movement and once each week thereafter. The first report was issued August 26, and the last March 29. It contains prices telegraphed by members of the Fruit Branch located in marketing centres from Halifax to Vancouver, and also during the export

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season the prices paid on the large markets in the United Kingdom are cabled direct by the Canadian Fruit Trade Commissioner at Liverpool. The mailing list for this report has grown, by individual request, from 1,200 in 1914 to 2,700 the past season.

SUGAR

The question of Canada's sugar requirements for the preserving season of 1920 was given earnest consideration and, as the control of imports and exports continued to be exercised by the Canadian Trade Commission, the Fruit Branch co-operated with this body in every way possible in the matter of obtaining an equitable distribution of supplies. In the early part of June it appeared that there might be a shortage and officers of the Branch made a comprehensive survey of the situation throughout Canada. It was found that in only two districts was there a real shortage, which was no doubt due to labour troubles that prevented two of the largest refiners operating for several weeks. These labour difficulties were soon overcome, and with all refiners working practically to capacity, the danger of a shortage was removed. The control of imports and exports was removed on July 1st and it was feared that this would result in an acute shortage. However, the refiners gave assurance that they would continue to give preferred attention to the Canadian requirements, especially for canning and preserving. The season passed without any shortage, but the higher price no doubt resulted in a smaller proportion of the fruit being canned.

PACKAGES

In Ontario a serious situation arose on account of the shortage of packages caused by the large fruit crop and also by the destruction by fire of one of the largest fruit basket factories in Ontario. Efforts were put forth by the Fruit Branch to obtain packages from the United States and to interest other manufacturers in the production of packages but, very early in the season, we were called upon to decide between the enforcement of the Inspection and Sale Act with regard to standard packages and the loss of fruit. The Act, therefore, in this regard was not enforced during the past season and packages of various specifications and dimensions were used, some of which proved very unsatisfactory. As soon as the danger of loss of fruit was averted the package manufacturers were advised that in future all fruit packages must conform to the requirements of the Act, and it is intended to strictly enforce the regulations during the season of 1921. The price of fruit containers in many provinces reached new high levels, especially in Ontario where apple barrels sold as high as \$2.50 each. The average price, however, was not more than \$1.50. The high price no doubt resulted in larger quantities than usual being shipped bulk in car lots, and the effect on the tender fruit shipments was to limit these in many cases to the better quality only.

APPLE CENSUS

In 1919 a census of apple production in Ontario and Quebec was taken by our fruit inspectors, and the results, compiled and issued in pamphlet form by the Dominion Bureau of Statistics, were of considerable value. Appreciating the importance of accurate information in regard to production and feeling that it was not safe to base future estimates entirely on the results of one year, particularly an abnormal season such as 1919, the inspectors were authorized to take a similar census of the 1920 apple crop. The Dominion Bureau of Statistics again co-operated with us in tabulating the returns.

EXPORT TRADE

Owing to the partial failure of the apple crop in the United Kingdom it was expected that the early varieties would meet with a ready sale at satisfactory prices. With the arrival of the first consignments these expectations were fully realized, but

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very soon the high price, together with the advantageous exchange rates, resulted in large consignments being imported from the Continent, and the market declined rapidly. Efforts were renewed to have the control removed from apples, with the result that the Food Administration announced the suspension of the apple Control Order from August 1 to November 14. After the latter date the order again became effective, but the retail maximum price was increased to 10d. per pound, which was 1d. per pound in excess of the maximum retail price obtaining since December 6, 1918. A very slight increase was provided in the maximum price to be paid to primary handlers. Representation was again made to the Food Administration that the order be repealed, as it was felt that the objective of the order, which was that the price of apples as food should not be prohibitive to the masses, was assured by the big crop in Canada and the United States. There were certain varieties which always commanded a premium over others, and the removal of the control would permit our exporters receiving the increased price for these few varieties without incurring any hardship to the average consumer. In the attempt to have the control removed during the shipping season we were not successful, but it was finally repealed, effective March 31, too late to be of any advantage to Canadian shippers.

At the opening of the season there was a reduction of \$1 per barrel ocean freight on apples and pears under refrigeration, as compared with the previous season. Apples in ordinary stowage remained at \$2.50 per barrel and 70 cents per box. This was reduced on December 14 to \$2 per barrel, but with no change in the box rate, and on January 10, as the result of fruit shipping companies chartering steamers to carry full cargoes, the regular steamship lines again reduced the rate to \$1.75 per barrel and 60 cents per box.

As the result of heavy losses through handling apples in boxes, the Liner Committee, representing steamship companies operating between Canada, the United States and the United Kingdom ports, issued an order requiring all apples in boxes to be strapped or wired. During the previous season accurate data had been obtained which supported the action of the steamship companies, which received the endorsement of the Fruit Branch. Later in the season this order was modified, and permitted shippers, who would exempt steamship companies from responsibility for loss caused by handling, to ship without strapping or wiring. Unfortunately several shipments went forward without strapping or wiring and were reported to have landed in a damaged condition. The strapping or wiring is considered one of the cheapest forms of insurance, and it is to be hoped that the steamship companies will insist upon this being done hereafter. Complaints have also been received from Railway Lines operating in the United Kingdom, who distribute a great portion of the imports, that they have incurred heavy losses in handling boxes which were not wired or strapped.

A much greater interest was taken in the Canadian export apple trade by importers in the United Kingdom, as evidenced by the unusual number of representatives of large importing firms who visited Canada during the past year.

Mr. J. Forsyth Smith, Canadian Fruit Trade Commissioner in Great Britain, who for the past four or five years has devoted the greater portion of his time to promoting the interests of the fruit industry of Canada in Great Britain, visited Canada during the summer, and meetings were arranged by the Fruit Branch in all the fruit-growing provinces in order that those interested in the export markets might have an opportunity of meeting Mr. Smith and discussing with him the export market situation. These meetings were very well attended, and growers appreciated the opportunity of receiving first-hand information.

TRANSPORTATION

The relation between the fruit and vegetable producer and cheap, rapid, safe transportation is most intimate. It cannot be too much so. The manifestation of interest by the transportation companies operating in Canada in the development and

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success of these industries has been more pronounced during the past year than during any other period. This interest has been reflected in the work of our Transportation Division by a closer co-operation in matters of investigation, educational and experimental undertakings, the amending of tariffs and traffic regulations intended to promote the general welfare of the fruit and vegetable industries.

Many important fruit transportation matters have been dealt with during the year. Frequent conferences were held with railway, express and steamship officials with a view to effecting a wider distribution, the opening of new markets and other improvements connected with the transportation of this product.

Several traffic matters which could not be satisfactorily adjusted in conference, were filed with the Board of Railway Commissioners and sittings attended in the interest of the producers and shippers.

With a view to improving methods of distribution, car loading, and to establish the proper type of cars to be used in fruit transportation under refrigeration, a series of experimental shipments were conducted from British Columbia points. These shipments included straight carloads of fruit, mixed carloads of fruit and vegetables and straight carloads of vegetables, and comprised the brine tank, Bohn and A.B.C. system of refrigeration. Eleven carloads moved by express and nine by freight. As a result of this work the carriers are altering the interior construction of brine tank cars to conform with suggestions offered. A greater confidence has also been created among shippers, particularly in moving fruit to long-haul markets. Several further recommendations in connection with this work have been made to the carriers which would improve the service and assurance has been given that consideration will be given same.

At the urgent request of shippers, experienced men were again stationed in Nova Scotia and Prince Edward Island to advise and assist the shippers in traffic matters; to investigate complaints and to negotiate local traffic arrangements necessary to expeditiously move the apple and potato crop.

Meetings were attended and addressed by the transportation specialist at different points in British Columbia, Ontario and the Maritime Provinces.

With a view to arriving at a basis of compromise, and avoid if possible the necessity of public hearings before the Board of Railway Commissioners, conferences for the discussion of complaints between carriers and shippers were arranged and attended. In this connection it was suggested to the Board of Railway Commissioners that a Perishable Freight Division should be organized in connection with the Canadian Railway Associations for the purpose of dealing with complaints or suggestions in connection with the movement of perishable products. Advice has been received to the effect that a sub-committee has been appointed for the purpose outlined.

INSPECTION SERVICE

Very little change was made in the inspection staff which, during the season, consisted of seventeen permanent inspectors and thirty-four seasonal men employed during the period of heavy movement. Since 1915 the greater portion of the inspection work has been done in the shipping districts and this system continues to prove satisfactory, enabling our inspectors not only to examine the fruit as it is packed, but also to give instruction in the proper methods of picking, packing, grading and shipping. This work, educational in character, has been much appreciated by growers and shippers. In connection with packing, our officers have co-operated directly with the Provincial Departments of Agriculture, members of the Fruit Branch having been loaned on many occasions to conduct packing schools or to give assistance at short courses at the agricultural colleges. In addition, one officer of the branch devotes practically all his time to giving instruction in barrel and box packing.

Special attention was given to visiting basket, box and barrel factories for the purpose of ensuring a supply of packages of standard sizes and dimensions for the 1921 season.

Where violations of the Act were reported, whether with respect to fruit, fruit packages or potatoes, each case was thoroughly investigated by the chief inspector for the district in which the offender lived. Owing in part to the generally good quality of the fruit produced last season and also to the cumulative effect of the work done by our inspectors since the inception of the Act, it was found necessary to prosecute in nineteen cases only. One of these convictions was for the shipping of immature fruit, an evil that has always been present to a certain extent but with which we have now authority to deal under the amendments to the Act of 1918. In another case, a shipper used old baskets with as many as four different growers' names upon them; and in two cases shippers were prosecuted for using barrels under the standard size. The publicity given these convictions will have the effect of impressing the requirements of the amendments on growers and shippers.

Variety.	No. of lots Inspected.	No. of pkgs in lot Inspected.	No. of pkgs. Inspected.
Apples.. bbls.	7,595	812,637	51,425
Apples.. boxes	3,125	951,198	36,874
Apples?.. bsks.	302	43,255	2,878
Pears.. boxes	572	99,501	5,590
Peaches.. boxes	1,060	206,025	12,089
Plums.. bsks.	873	210,158	11,322
Tomatoes.. bsks.	736	114,914	7,775
Small fruits.. pkgs.	2,345	148,033	20,358
Grapes.. bsks.	178	174,551	5,048

The Publications Branch of the Department of Agriculture is charged with the distribution of departmental publications, both in English and in French, and with the issuing of *The Agricultural Gazette of Canada*.

The compilation of mailing lists covering the whole of Canada and their continual revision to insure their being kept up to date is an arduous and somewhat complicated undertaking. Of these addressing lists, the general mailing list alone comprises 222,000 names, classified and subdivided. These lists may be combined in any manner desired, so that the persons whose names appear thereon receive such publications as are likely to interest them and no other, thus making for economy in distribution. The names comprising the general list are obtained in various ways, but chiefly through the distribution of return postcards, by means of which the applicant signifies his desire to be placed on the list for such classes of publications as he may specify.

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majority of the department's publications are now sent only on special request. The fact that a person's name is on the mailing list for a certain class of publications will not insure his being sent all publications of that class, but only those that are published in such quantities as to be available for general distribution.

This change of policy, which was determined upon by the Government Editorial Board, while working in the direction of economy, has led recently to a good deal of unavoidable misunderstanding and complaint on the part of persons who assumed that everything would be sent them as a matter of course when once their name was on the list. To meet the situation the branch now sends out with *Seasonable Hints*—a periodical that goes to everybody on the addressing list—a circular giving the titles of such publications as are available only on request.

In order to meet the requirements of the Editorial Committee as to list revision, the branch is now issuing a circular to all persons appearing on the general mailing list, requiring them to notify the branch if they desire to continue to receive the department's publications. The names of those who do not respond will be dropped. The task of revision, in order to avoid complete disorganization of the system, will require about a year to accomplish. It is anticipated that with the curtailment in the lists, which will necessarily follow revision, a greater number of publications can be sent to those whose names are retained than has been the case in the immediate past. So far as *Seasonable Hints* is concerned, the list will remain intact, and will constitute a medium for reaching, when necessary, every one of the 250,000 names appearing thereon.

Another list is known as the "Special General." It includes members of Parliament, members of the legislative assemblies, newspapers, consuls, libraries, and the principal officials of the Dominion Department and of the Provincial Departments of Agriculture. To the 3,250 names appearing on this list is sent everything issued by the department. There are also lists of agricultural college officials, agricultural representatives, secretaries of agricultural societies, United States agricultural officials, and of persons, newspapers, and institutions, both Canadian and foreign, who have expressed a desire to receive the publications of the department.

A number of branches of the department have compiled special lists of their own of persons and organizations who are interested in technical publications, regulations issued under Acts of Parliament, circulars to importers, exporters, produce dealers, and drovers; news letters, market reports and similar communications. Material of this kind is despatched by the branch as required.

The day-to-day requests for publications, in English and in French, are numerous and require to receive special and prompt attention. They often include requests that have to be referred to other departments of the Dominion Government, and sometimes to Provincial Government departments. In order to meet them satisfactorily, discrimination and experience is called for on the part of those in charge of the work.

During the past five years, the Publications Branch has distributed upwards of 13,000,000 copies of publications of various kinds, with the object of placing in the hands of those interested the results of the work carried on by the department in the interest of the agricultural industry. In the year 1920, 2,262,850 copies of publications were distributed, of which some 410,175 were sent out in response to direct request. Under the changed procedure indicated above, the number of special requests will without doubt become far more numerous than in the past.

The addressing work is done automatically by machinery from embossed name and address plates, with the exception of the special request addressing, which is necessarily done by hand. The address plates are made by the branch. The folding of circulars and the sealing of envelopes is also now being performed by machinery, but not the filling of envelopes—a work involving considerable labour where a large edition like that of *Seasonable Hints* has to be despatched in a comparatively short period of time.

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The following table shows the number and character of the publications issued during the past twelve months:—

Reports..	15,719
Bulletins..	234,314
"Seasonable Hints"..	712,911
Pamphlets..	117,629
Circulars..	168,155
Leaflets..	27,058
Announcements, application, mailing list cards, posters, etc...	922,316
The <i>Agricultural Gazette</i>	64,748
Total..	2,262,850

THE AGRICULTURAL GAZETTE

The publication of the *Agricultural Gazette of Canada* was begun seven years ago in response to a demand for more widespread information in regard to the work being carried on by the Departments of Agriculture. Its pages are not limited to Dominion work alone but are equally at the disposal of provincial Departments of Agriculture, and also of education, in so far as the work of the latter relates to agriculture. It is not intended that this magazine shall cover the sphere of technical work nor, to any extent, of applied agriculture, so that in no sense does it intrude upon the field of the agricultural press. It is published both in English and in French. No payment is made for contributions.

In addition to giving a more extended publicity to governmental work on behalf of agriculture, the *Gazette* was originated with the object of keeping agricultural workers informed as to what was under way in other provinces and to acquaint them with the methods adopted elsewhere, thus enabling them to keep in touch with the progress being made in this field of endeavour. These objects are of great importance to the agricultural industry, and the response on the part of Dominion and provincial officials has in the main been very gratifying, and by degrees more are coming to realize the opportunity that this periodical places at their disposal for advertising their work before the public and for creating wider popular appreciation of the various forms of endeavour engaging their attention. The knowledge on the part of the public, and also of the farmers themselves, of the work carried on in the fields of experiment, research, investigation, and demonstration by Government institutions is for the most part very limited, and one of the leading objects of the *Gazette* was to secure greater recognition and appreciation of these endeavours, and a fuller realization of what they signify to the country's welfare. The *Gazette* is also the medium through which publicity is given to the agricultural information and statistics issued by the International Institute of Agriculture.

Beginning with the first of January, 1920, the *Gazette* was made a bi-monthly instead of a monthly publication. It is not intended for general distribution, but is sent free only to members of Parliament, Dominion and Provincial, to the newspaper and agricultural press, to agricultural officials, provincial educational officials and teachers of agriculture, to school and college and other libraries, technical agricultural workers and to persons who act as crop correspondents for the Agricultural Statistical Branch of the Department of Trade and Commerce. There is a foreign exchange list, and a small list of paid subscribers. The *Gazette* mailing list comprises, all told, some 7,650 names.

Early in 1921 the branch took up new quarters at 70 Queen street, where better facilities are offered for the efficient performance of the work.

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THE AGRICULTURAL INSTRUCTION ACT BRANCH

The Agricultural Instruction Act, 1913, provided for the payment to the provinces of the sum of ten million dollars in a period of ten years for the purpose of aiding and advancing the farming industry of Canada. The allotment, by provinces, for the fiscal year 1920-21 was as follows:—

Ontario.. . . .	\$336,303 26
Quebec.. . . .	271,113 76
Manitoba.. . . .	77,113 11
Saskatchewan.. . . .	81,728 48
Alberta.. . . .	66,965 62
British Columbia.. . . .	69,199 06
Nova Scotia.. . . .	81,716 69
New Brunswick.. . . .	64,110 80
Prince Edward Island.. . . .	31,749 22
Veterinary Colleges.. . . .	22,000 00
	<hr/>
	\$1,100,000 00

The grant is intended to supplement provincial appropriations and is made with a view to enabling the provinces, by means of the additional funds thus placed at their disposal, to finance and carry out instructional efforts in the interest of agriculture in a more extended and comprehensive manner than would otherwise be possible.

The Act is designed to promote a knowledge of better farming methods, to promote rural welfare, to encourage agricultural education in elementary and other schools, and to assist colleges and schools of agriculture, and schools of veterinary science.

The projects on which the grant may be expended are left to the provinces to determine in accordance with their individual needs. Great latitude is allowed by the Act as to the undertakings to receive assistance, and these are many and varied, but by means of agreements made each year between the governments of the provinces and the Dominion, the Federal Minister of Agriculture exercises a measure of control as to the nature of the work performed, and observes that it is designed to carry out the objects and purposes which the Act has in view.

INSTRUCTION AND DEMONSTRATION •

An important phase of agricultural instruction work contemplates the conveyance of up-to-date information to adults as to the best methods and practices connected with farming. All practical forms of extension and demonstration are contemplated under this head. The leading Instruction and Demonstration activities of the year included the following:—

Assistance to the Agricultural Representative System.—During the year about 100 local representatives of provincial departments of agriculture carried on extension work in farming communities;

Promotion of Co-operation and Marketing;

Horticultural Demonstrations;

Instruction in live stock, dairying, poultry and bee-keeping;

Instruction in field husbandry, including crop competitions, demonstration plots, weed control and seed production;

Demonstrations with Soils and Fertilizers, Underdrainage demonstrations;

Short Courses; Demonstration Trains.

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ASSISTANCE TO WOMEN'S INSTITUTES

Women's Institutes were designed to promote a more congenial environment for rural women and to improve the conditions of home and social life in the country. They constitute a medium for conveying instruction in household science and the domestic arts—cooking, nutrition, dressmaking, home-nursing, sanitation, and community welfare in general. In all the provinces, with the exception of Ontario and Quebec, the cost of the work is met entirely from the grant.

AGRICULTURAL EDUCATION

A very important phase of the work carried on under the Act has to do with the education of country youth. It presents two aspects, the scholastic and the vocational. In order to bring the scholastic aspect more into line with country environment, elementary agricultural teaching was introduced. The concomitants of this movement are the school and home gardens, the home project, boys' and girls' club work, and the school fair. Since the Act became effective practically all the provinces have made notable progress in these undertakings, and in their development the grant has liberally assisted.

BOYS' AND GIRLS' CLUBS AND SCHOOL FAIRS

Organizations of this character are now general in most of the provinces, and probably no other form of agricultural instruction brings more satisfying results as that carried on through such mediums. During the year nearly 100,000 children attended the Ontario School Fairs. In Quebec the total number of scholars taking part in gardening was 27,350. In Manitoba 26,500 boys and girls were enrolled in the club movement.

COLLEGES AND SCHOOLS OF AGRICULTURE

The development of the vocational phase includes the increased efficiency of Colleges of Agriculture and the provision in certain provinces of vocational agricultural schools of less than college grade, which lead directly to the farm. Since 1912, almost \$2,000,000 has been expended in the form of grants to agricultural colleges and in providing and maintaining district agricultural schools. The grant has enabled the colleges to enlarge their capacity, strengthen their staff, add to their equipment, and to finance extension work. The agricultural schools of Alberta are maintained largely by the grant, while the Kemptville School in Ontario is being established and maintained entirely from this source. During the year, an agricultural school was instituted at Charlottetown, Prince Edward Island, which is being assisted from the grant. The institution of special courses and departments in recognized high schools, while not perhaps vocational in the more restricted sense, bears a relationship to the movement for the extension of adequate educational opportunities appropriate to country life to all country boys and girls. This endeavour the grant facilitates, and its achievement gives promise of permanent benefit to agriculture and to those who look to it as a means of livelihood.

THE INTERNATIONAL INSTITUTE BRANCH

The commissioner was delegated to attend the meetings of the Fifth General Assembly of the International Institute of Agriculture, held at Rome, November 3-11, 1920. One hundred and fifteen delegates, representing forty-eight out of the sixty adhering Governments, were in attendance, comprising practically all the European countries except Austria and Turkey. Great Britain and Ireland had seven representatives, including the leading officials of the Boards of Agriculture of England, Scotland and Ireland.

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The proceedings were opened by His Majesty, the King of Italy, who took occasion to have it announced that, in addition to his gift of \$60,000 annually, he had decided to make a donation of one and one-half million lire from the resources of his private estates, for the purpose of further extending and improving the Institute Palace.

Owing to the rise in the cost of printing and of the staff, the Assembly decided to ask the adhering Governments to make a supplementary contribution for the years 1921 and 1922, equal to one and one-half times the ordinary contribution, and payable by each country in its own money on the basis of the par value of the franc.

The chief new recommendations of the Assembly, which are referred to in fuller detail in the Canadian delegate's report (appendix No. 1), are, in addition to insistence on the fulfilment of various earlier decisions, enumerated as follows: That there be established a system of continuous correspondence between the Governments and the Institute in the form of a special bureau on the lines of the Canadian office. That tea be added to the products to be reported upon regularly. That there be conducted an inquiry into the methods adopted during and following the war for the purpose of increasing agricultural production. That agricultural attachés be appointed in countries between which there is a considerable agricultural trade. That there be appointed in each country a Permanent Committee of Agricultural Meteorology, also a Central Bureau of Agricultural Accountancy. That Professor Eriks-son's plan for the creation of an International Research Institute of Plant Pathology be proceeded with. That the Governments provide scholarships to enable agricultural students to complete their studies at the Institute; that they, moreover, establish a Consultative Committee of agricultural specialists to co-operate more directly with the Institute. That greater extension be given to the translations of Institute publications, especially into English, and that there be substituted for the metric system of figures expressions of area and capacity more easily understood in that language. That the Assembly's lengthy debate on the agricultural labour problem, about to be presented to the Geneva Labour Conference, be sent to the various Governments as a protest against possible action by town delegates ignorant of agricultural conditions. That the Institute heartily co-operate with the League of Nations while retaining its own autonomy. That the various Governments declare their formal adherence to the International Conventions on Plant Pathology and for the organization of control of grasshoppers.

The statistical work of the branch was carried out as usual during the year. Reviews of the world's food supply with special reference to wheat were published in the *Agricultural Gazette* under the following titles: "The World's Wheat Prospects for 1920-21;" "The Crops of 1920- World's Wheat and Livestock Situation." The latter article included detailed figures of the numbers of livestock in the different countries before the war and on the most recent date for which official estimates were available.

Statistical information on the world's crops and live stock, trade in agricultural products, prices, etc., was also furnished to a large number of correspondents both in Canada and in foreign countries.

The Institute Statistical Bulletin has been made much more valuable to Canadian readers by the fact that the data for area and production in the English edition are now given in acres and centals, instead as formerly in hectares and quintals.

The International Year Book of Agricultural Statistics for 1917-18 was published in the fall of 1920. It is a large volume of 700 pages containing the most complete existing series of statistical data connected with agriculture for almost all countries. This is the last world year book to deal with the states according to the political frontiers of pre-war times. Future issues will deal with the countries as newly constituted.

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The "International Review of the Science and Practice of Agriculture" and the "International Review of Agricultural Economics" were received and distributed as usual. The articles in these bulletins of interest to Canadian readers were published generally in summarized form in Part V of the *Agricultural Gazette*. Much of the information sought by correspondents, including material for extensive studies on agricultural co-operation and co-operative credit, was furnished from these Bulletins and by reference to the original documents, summaries of which are published in the bulletins. Nearly all the original documents are received in the library of the branch.

The ninth volume of the International Year Book of Agricultural Legislation was published. It contains information of considerable interest inasmuch as it gives an account of the measures adopted in many countries for coping with problems of the transition period from a state of war to one of peace.

There is a strong movement among the English speaking delegates to the Institute to have future issues of the Year Book translated into English. At present only the analytical index is translated. Under a new arrangement advance sheets of important laws are being printed and distributed shortly after their enactment.

The Institute, as usual, was kept informed concerning Canadian agriculture. Monographs were furnished on the extent, composition and product of the forests of Canada, book-keeping among farmers in Canada, and agricultural credit in the different Provinces.

The Library.—During the year 1,345 bound volumes were added to the library, making a total of 8,978. The total number of pamphlets received was 10,692. An average of 1,050 periodicals was received every month. These include all the periodicals covered by the "Agricultural Index". There are now over 215,000 cards in the catalogue.

As will be seen from the following table, a large number of persons availed themselves of the library to borrow books:—

	Number of Borrowers.	Number of books Borrowed.
Department of Agriculture (Ottawa)	80	752
Ottawa, except Department of Agriculture	115	1,009
Ontario, exclusive of Ottawa	67	330
Prince Edward Island	6	21
Nova Scotia	7	24
New Brunswick	9	32
Alberta	16	65
British Columbia	29	111
Saskatchewan	16	121
Manitoba	17	58
Quebec	50	222
United States	3	9
Total	415	2,754

During the course of the year bibliographies were prepared on the following subjects: agricultural credit, electro-horticulture, genus Brassica, mosaic diseases, potato scab, marketing of wheat, smooth awned barley, fruit growing and marketing, flax in Canada, apple disease and history, effect of freezing on immature grains, co-operation, condensed milk, history of economic plants, roses—culture and diseases, strawberries, culture and diseases, oats, culture and diseases, water requirements of crops, etc.

The whole respectfully submitted.

S. F. TOLMIE,

Minister of Agriculture.

APPENDIX No. 1

INTERNATIONAL CONFERENCE FOR THE ORGANIZATION OF THE
CONTROL OF GRASSHOPPERS, ROME, OCTOBER 28-31, 1920

This International Conference was held at the Palace of the International Institute of Agriculture shortly before the opening of the meetings of the General Assembly of the International Institute of Agriculture. Thirty-six delegates, representing twenty-five countries, were in attendance, under the Presidency of Hon. Senator Professor Battista Grassi, of Italy; Vice Presidents: Messrs. Julio J. Bolla, of Argentina, F. B. Y. Sevilla, of Spain, M. Lesage, of France, Sir Thomas H. Elliott, Bart., K.C.B., of Great Britain; Reporting Secretary: Mr. Louis Dop, of France, Vice President of the International Institute of Agriculture. The other British delegates were Mr. Gilbert Storey, of Egypt, and Mr. T. K. Doherty of Canada.

The proceedings were opened by His Excellency Dr. Micheli, the Italian Minister of Agriculture and the Italian Secretary of State for Foreign Affairs, under the provisional Presidency of the Hon. Edouardo Pantano, ex-Minister, and President of the International Institute of Agriculture.

The earlier basis for the discussions of the Conference was the well considered monograph prepared by the Institute a few years ago at the request of the Italian dependency of Erythrea, and later the initiative of the French Protectorate of Morocco in requesting the Institute to convoke an International Conference. The French and Italian Governments in full accord charged the Institute with the task of convocation. All the preliminaries of the Conference had been conducted by Mr. Louis Dop, whose detailed report and well directed activities during the Conference rendered the task of the delegates comparatively light. Inspiration was also derived from the International Conventions already in existence affecting certain groups of countries, and especially the Convention of Pretoria for the Union of South Africa, which was eminently successful, and the Conventions of Montevideo, Uruguay, for South America, which has been particularly concerned with the original sources of the invasions.

After three days' discussion the text of the Convention was agreed upon on October 31st, and signed by delegates vested with full powers, and those believing themselves vested with full power in virtue of their appointments as delegates, or in possession of a telegram conferring full powers. Declarations that they had not the authority to sign were made by the delegates for Great Britain, Canada, Spain, and Greece. The Convention was signed by the representatives of nineteen countries, namely: Argentina, Bulgaria, Cuba, France, Africa, Algeria, Indo-China, Madagascar, Morocco, Tunis, Hungary, Italy, Erythrea, Italian Somalia, Tripolitania, Cyrenaica, Mexico, Uruguay, Kingdom of the Serbo-Croato-Slovenes.

The nature of the Convention intended for universal application is quite general. It limits its activities to the theoretical side of the question. For the realization of the practical side there would be established sub-conventions for each kind of grasshopper between the different States which suffer from the pest, each of the sub-conventions having for the organization of its campaigns one or more general centres or headquarters, chosen within the limits of the territories interested. The Rome Convention provides means for the general centralization and exchange of information which would serve for all the organized groups.

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The following is a free translation from the French text of the Convention of October 31, 1920.

The undersigned plenipotentiaries of the Governments hereunder enumerated, being assembled in conference at Rome at the Palace of the International Institute of Agriculture, are agreed in the following dispositions:

Art. 1. The contracting States engage to take the necessary measures for the purpose of combating the grasshoppers susceptible of injuring the crops of the neighbouring States, signatories of the present Convention.

Art. 2. They are to take all useful dispositions to protect by the most rapid means possible the neighbouring adhering States against the movements of grasshoppers contemplated in Article 1.

Art. 3. They may, in their mutual interests, conclude particular agreements with a view to the adoption of common measures for the purpose of facilitating the control of the grasshoppers.

Art. 4. They recognize from the signing of the present Convention the International Institute of Agriculture at Rome as the international official centre of documentation and vulgarization in respect to all questions having reference to the control of grasshoppers. They engage to furnish it at least once a year, and oftener if the circumstances require it, with all the information of a technical, scientific, legislative and administrative order collected on the question by competent persons. The Institute will give to this information the widest and most rapid publicity.

Art. 5. Every proposal emanating from a contracting State and having for its object the modification of the present Convention shall be communicated by that State to the Institute and presented by the latter to a meeting of the delegates of the contracting parties, which shall be convoked at Rome by the Institute on the occasion of the General Assembly of that institution. The proposals made by the delegates shall afterwards be submitted to the approval of the States which have adhered to the Convention.

Art. 6. The present Convention shall be signed and ratified as soon as possible, and the Convention shall be deposited with the Italian Government as soon as three at least of the contracting States are in a position to do so. Every ratification shall be communicated by the Italian Government to the other contracting States as well as to the International Institute of Agriculture.

Art. 7. Every State, Dominion or Colony which freely governs itself and which has not signed the present Convention, is, on its own application, admitted to adhere to it. The Colonies on the application of the States of which they are dependencies may equally be admitted to adhere to it on the same conditions as the independent States.

Art. 8. Adherence will be notified through diplomatic channels to the Italian Government and by the latter to the contracting Governments as well as to the Institute.

Art. 9. The present Convention shall enter into force for at least the first three States that shall have ratified it within a delay of three months reckoned from the date of ratification, for the other States, within a delay of six months, in accordance with the deposit with the Italian Government of their ratification and of their adherence.

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In faith of which the plenipotentiaries whose powers have been recognized in good and due form have signed the present Convention.

Executed at Rome, October 31, 1920, is a single copy, which shall be deposited at the Ministry of Foreign Affairs of Italy and of which properly certified copies shall be delivered to all the States adhering to the present Convention.

Immediately after the close of the formal proceedings the delegates for Egypt, Tripolitania, Tunisia, Algeria, Morocco and French Western Africa, proceeded under the Presidency of Mr. Louis Dop, in virtue of Article 3 of the Rome Convention to establish an organization for North Africa. An agreement was reached and signed, having for its general object the collection of useful information on the flights of grasshoppers in these territories for the purpose of investigating whether there exists permanent breeding zones and, in a general manner, for the purpose of securing the most precise data possible on the natural laws in accordance with which invasions occur, and of determining thereafter the measures to be adopted for an effective campaign. A definite organization to that end was affected and is contained in six short articles which may be resumed as follows: Establishment of a Central Service (Algiers). Local fixed observers and travelling observers to report on model forms flights of insects, the first flights to be telegraphed. Flight maps prepared at Central Bureau and addressed to interested regions the first and 14th of each month. Local biological studies undertaken and results communicated to the Central Bureau, then forwarded to all interested, together with the results of the Central Bureau's own work. These various dispositions to be taken promptly in compliance with Article 2 of the Rome Convention.